

Water Resources Restoration Master Plan

DuPont State Recreational Forest
North Carolina

Prepared for:
North Carolina Forest Service



Prepared by:



ZINK ENVIRONMENTAL, PLLC

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EXECUTIVE SUMMARY

The North Carolina Forest Service (NCFS) requested that Kee Mapping and Surveying, PA (Kee) develop a Water Resources Restoration Master Plan for DuPont State Recreational Forest (SRF). This Master Plan identifies future water resources restoration efforts to improve the water quality and ecological function of waters within DuPont SRF, located in Henderson and Transylvania Counties, North Carolina. It is anticipated that the NCFS will utilize this master plan, which includes conceptual design information on selected stream reaches, to prioritize restoration efforts and to request grant funds and other support to complete selected restoration work.

Assessment forms were developed to document stream conditions and areas of concern encountered within DuPont SRF. Two forms were created: one named "Stream Condition Assessment" and one named "Area of Concern Assessment". The "Stream Condition Assessment" form documents conditions for a stream reach, and results in an overall score based on site and watershed conditions, channel morphology and condition, floodplain morphology, vegetation, and habitat. The "Area of Concern Assessment" form was developed to document problems observed that do not correspond to a long stream reach. These areas of concern typically occur at a point, such as a trail crossing of a stream, and do not necessarily represent a systemic problem along the stream.

All mapped trails and roads within DuPont SRF were covered by walking, biking, or driving. Water bodies visible from the trails and roads were visually assessed to determine if an assessment form should be completed. As needed, field personnel bushwhacked along or through the streams. Additionally, NCFS personnel provided information about known problem areas. A total of 17 stream reaches and 51 areas of concern were documented using the field forms. Each of these 68 sites was also photo-documented and mapped using hand-held GPS. All digital data has been organized into a GIS-based project geodatabase. A large (22 x 34 inch) base map was created showing the location of each of the 68 sites. Additionally, an 11 x 17 inch sheet was created for each site, showing photographs, assessment data, and site detail overlaid over an aerial photo.

All sites were categorized as High, Moderate, or Low priority for implementation of restoration efforts. Priorities represent best judgment based on observed conditions and the potential for improvement from restoration efforts. Of the 68 sites, 10 are High priority, 23 are Moderate priority, and 35 are Low priority. Commonly observed problems in the stream assessments included: trail within riparian buffer, lack of appropriate riparian vegetation, and sediment input to the stream (often from adjacent trail and/or eroding streambanks). Many of the areas of concern are locations where a trail or road crosses a stream, resulting in sediment and stormwater input to the stream. These types of areas could be improved by relocating/closing the trail or improving the trail in the vicinity of the crossing to reduce sedimentation. Such sites should be considered as a part of future master planning for trails within DuPont SRF.

The 10 High priority sites include:

- S02, Little River above Bridal Veil Falls
- S15, Shoal Creek
- S17, Little River at Hooker Falls Road
- P06, Bridge/crossing near Little River
- P17, Airstrip Trail below Airstrip
- P34, Triple Falls Trail along Little River
- P42, Stone Mountain Trail
- P44, Stream at Switchback Trail
- P48, Fawn Lake
- P49, Power lines at Fawn Lake Road

A narrative is provided for each of these 10 High priority sites, with additional information about existing conditions and potential restoration approaches. For the High priority stream sites (S02, S15, S17), conceptual design plans are included, as well as conceptual design information related to typical riffle and pool cross-sections, longitudinal profiles, and planting information appropriate for these projects.

I. INTRODUCTION

The North Carolina Forest Service (NCFS) requested that Kee Mapping and Surveying, PA (Kee) develop a Water Resources Restoration Master Plan for DuPont State Recreational Forest (SRF).

This Master Plan identifies future water resources restoration efforts to improve the water quality and ecological function of waters within DuPont SRF, located in Henderson and Transylvania Counties, North Carolina. Location and property maps, developed by the NCFS, are included as Appendix A. The physical functions of some of the stream reaches included in this area of interest are currently degraded due to adjacent land use, historical channelization and realignment. Existing undersized and oversized stream crossings on state forest roads and trails have outlasted their intended design life and exhibit reduced function (including deposition and scour). Combined with less-than-ideal riparian forest buffer conditions, channel incision, and over-widening (bank erosion), these factors have reduced channel habitat and ecological functions. Some of these adverse stream impacts resulted from the former landowner's intent and subsequent road construction to create an exclusive residential mountaintop development. A number of water resource impacts have also been caused in recent years by heavy recreational pressure on the >80 miles of trails within DuPont SRF that are used for hiking, mountain biking, and horseback riding by approximately 350,000 visitors annually. Forest road travel by NCFS personnel has also dramatically increased to patrol trails for visitor safety and compliance with SRF rules and regulations. Some of the trails/roads are located within riparian buffers and cross perennial and intermittent streams. It is anticipated that the NCFS will utilize this master plan, which includes conceptual design information on prioritized stream reaches, to prioritize restoration efforts and to request grant funds and other support to complete selected restoration work.

Kee has performed the following scope of services:

TASK 1: Existing Conditions Data Collection

- Assemble any readily available existing data (aerial imagery, 2-5 foot contour topography, soils, land use/cover, and other relevant GIS files) related to watershed and stream conditions within the DuPont SRF and contributing watersheds.
- On-site assessments to ground-truth and determine priorities for restoration or improvement work.
- Assess and document existing riparian conditions including stream morphology, streambed substrate, streambank erodibility, floodplain land uses, vegetation composition, and equipment accessibility for treatment.

TASK 2: Stakeholder Engagement

- Meet with NCFS personnel to identify specific objectives and constraints for future stream and riparian corridor restoration efforts.
- Identify and analyze limiting factors for stream restoration project efforts based on stakeholder input.
- Present a summary of work completed, including the highest priority restoration projects.

TASK 3: Restoration Project Elements

- Using existing topographic data and supplemental detailed stream crossing data (from Task 1), develop and produce conceptual sketch plan figures for the highest prioritized and feasible restoration project elements, including stream plans, profiles, typical cross-sections, and planting zones.

TASK 4: Final Report

- Assemble an electronic Final Report consisting of all deliverables from Tasks 1, 2, and 3 to be delivered to NCFS and used to facilitate and support acquisition of additional funding to complete the priority restoration projects.
- Meet with NCFS staff to present findings included in Final Report.

II. METHODOLOGY

Assessment Forms

Assessment forms were developed to document stream conditions and areas of concern encountered within DuPont SRF. Blank forms are included as Appendix B. Before use in the field, these forms were reviewed by NCFS staff and field-tested. Two forms were created: one named “Stream Condition Assessment” and one named “Area of Concern Assessment”.

The “Stream Condition Assessment” form documents conditions for a stream reach, and results in an overall score based on site and watershed conditions, channel morphology and condition, floodplain morphology, vegetation, and habitat. This score can range from 0 to 20, and allows the stream to be categorized into one of four classes: Excellent (score 18-20), Good (score 13-17), Fair (score 8-12), or Poor (score 0-7). For the purposes of this study, forms were not completed for stream reaches that would have scored in the Excellent category.

The “Area of Concern Assessment” form was developed to document problems observed that do not correspond to a long stream reach. These areas of concern typically occur at a point, such as a trail crossing of a stream, and do not necessarily represent a systemic problem along the stream. Areas of concern can occur at a stream, though also include other points that may impact water quality, such as culverts, lakes, eroding areas, stormwater sources, and areas of concentrated human or animal use.

The assessment of stream conditions and areas of concern includes limited observations on potential public safety hazards that are inherent in outdoor recreational settings. This plan is not intended to provide a comprehensive safety analysis of DuPont SRF’s facilities, including the trail system. Trail users and other visitors to DuPont SRF are encouraged to recognize and avoid natural hazards to the extent possible, comply with DuPont SRF Forest Rules, and follow instructions on posted signs while on DuPont SRF property.

Site Identification

In order to identify sites, all mapped trails and roads within DuPont SRF were covered by walking, biking, or driving. Water bodies visible from the trails and roads were visually assessed to determine if an assessment form should be completed. As needed, field personnel bushwhacked along or through the streams. Additionally, NCFS personnel provided information about known problem areas. A total of 17 stream reaches and 51 areas of concern were documented using the field forms. Each of these 68 sites was also photo-documented and mapped using hand-held GPS.

Geodata

The data for this project has been compiled, analyzed, and placed into a dataset named “Sites” within the project’s geodatabase. There are two feature classes in that dataset: “AreasOfConcern” and “StreamConditions”. The geodatabase is of the structure: *Project Geodatabase -> Feature Dataset “Sites”*

-> *Feature Class “AreaOfConcern” and StreamConditions”*. Appendix C contains the complete features class structure for the two feature classes. This is also available as a Microsoft Excel file.

“AreasOfConcern” is a point feature class with a total of 51 sites within the project. Each site has an assigned Site ID beginning with a “P” and is a feature with populated fields based off of datasheets that were completed during site visits. Each feature in this feature class has five categories of issues that were observed: culvert, trail/road impact, upland/stormwater, lake/pond issues, and other problem areas. There is also a potential solutions category and a comments section for additional, more detailed notes about that particular site/feature.

“StreamConditions” is a line feature class which depicts approximate locations of stream sections that were determined in the field to be of concern. There are a total of 17 of these sites within the project. Each site is assigned a Site ID beginning with an “S” and is also a feature with populated fields based off of datasheets that were completed during site visits. Each feature in this feature class has five categories of issues there were observed: site and watershed conditions, channel morphology and conditions, floodplain morphology, vegetation, and habitat. Each of these categories has a list of several issues to choose from and are also scored on a range of 0-4, then totaled to provide a final score of 0-20. There is also a potential solutions category and a comments section for additional, more detailed notes about that particular site/feature.

Mapping

A large (22 x 34 inch) base map was created showing the location of each of the 68 sites (Appendix D). Additionally, an 11 x 17 inch sheet was created for each site, showing photographs, assessment data, and site detail overlaid over the latest aerial photo provided by NCOneMap (Appendix E and F). Credits for the base data include:

Aerial Imagery: NCOneMap (2010)

Trails: NC Department of Agriculture and Consumer Services, Kee Mapping & Surveying

Streams, rivers, and lakes: NC Flood Mapping Program

Roads: NC Department of Transportation

Contours: NC Flood Mapping Program

County and forest boundaries: NCOneMap

Waterfalls and parking: NC Department of Agriculture and Consumer Services

Powerline easement location: Pisgah Mapping Company

III. ASSESSMENT RESULTS

A summary of the assessed streams is presented in Table 1, sorted in order of priority for implementation of restoration efforts (High, Moderate, Low). Priorities represent best judgment based on observed conditions and the potential for improvement from restoration efforts. Commonly observed problems in the stream assessments included: trail within riparian buffer, lack of appropriate riparian vegetation, and sediment input to the stream (often from adjacent trail and/or eroding streambanks).

Table 1. Stream Assessment Summary (see Appendix E for detail about individual sites)

Site ID	Site Name	Score; Rating	Primary Concerns/Deficiencies	Major Elements of Potential Project	Priority
S02	Little River above Bridal Veil Falls	11 Fair	-sediment input -eroding streambanks -in-stream habitat	-improve/move trail -revegetation -human exclusion/signs	High
S15	Shoal Creek	7 Poor	-eroding streambanks/bed -riparian vegetation -floodplain access	-improve/move trail -revegetation -in-stream structures	High
S17	Little River at Hooker Falls Road	12 Fair	-sediment input -eroding streambanks -riparian vegetation	-improve/move trail -revegetation -human exclusion/signs	High
S05	Stream along Conservation Road	12 Fair	-clogged culvert/backwater -riparian vegetation	-culvert improvement -maintenance -revegetation	Moderate
S06	Tributary to Reasonover Creek	12 Fair	-eroding streambanks -floodplain access -in-stream habitat	-improve/move trail -revegetation -in-stream structures	Moderate
S07	Briery Fork Creek at Briery Fork Trail	10 Fair	-sediment input -eroding streambanks -riparian vegetation	-improve/move trail -revegetation -in-stream structures	Moderate
S09	Grassy Creek along Sandy Trail	11 Fair	-sediment input -eroding streambanks -riparian vegetation	-improve/move trail -revegetation -in-stream structures	Moderate
S11	Reasonover Creek below Lake Julia	5 Poor	-overwide channel -in-stream habitat -riparian vegetation	-revegetation -streambank grading -in-stream structures	Moderate
S12	Little River between High and Triple Falls	12 Fair	-sediment input -riparian vegetation -in-stream habitat	-improve/move trail -revegetation -maintenance	Moderate
S13	Little River upstream of Staton Road	11 Fair	-eroding streambanks -riparian vegetation	-improve/move trail -revegetation -human exclusion/signs	Moderate
S14	Stream along Rifle Trail	8 Fair	-sediment input -floodplain access -in-stream habitat	-improve/move trail -revegetation	Moderate

S01	Stream along Corn Mill Shoals Trail	14 Good	-sediment input -floodplain access -riparian vegetation	-improve/move trail -revegetation	Low
S03	Stream along Corn Mill Shoals Trail	14 Good	-sediment input	-improve/move trail -revegetation	Low
S04	Stream along Barn Trail	14 Good	-sediment input	-improve/move trail -revegetation	Low
S08	Tributary to Briery Fork Creek	16 Good	-sediment input	-improve/move trail -revegetation	Low
S10	Grassy Creek along Sandy Trail	13 Good	-floodplain access -riparian vegetation	-improve/move trail -revegetation -in-stream structures	Low
S16	Reasonover Creek along Reasonover Creek Trail	15 Good	-riparian vegetation	-improve/move trail -revegetation	Low

Tables 2, 3, and 4 contains a summary of the 51 areas of concern for High, Moderate, and Low priority sites, respectively. Seven sites are categorized as High priority, 15 as Moderate, and 29 as Low. Many of the areas of concern, especially the ones categorized as Low priority, are locations where a trail or road crosses a stream, resulting in sediment and stormwater input to the stream. These types of areas could be improved by relocating/closing the trail or improving the trail in the vicinity of the crossing to reduce sedimentation. Such sites should be considered as a part of future master planning for trails within DuPont SRF.

Table 2. Area of Concern Summary – High Priority Sites (see Appendix F for detail about individual sites)

Site ID	Site Name	Primary Concerns/Deficiencies	Potential Solutions	Priority
P06	Bridge/crossing near Little River	-bridge, trail/road crossing -sediment input	-crossing improvement -relocate/close trail -bridge replacement	High
P17	Airstrip Trail below Airstrip	-stormwater input -erosion -unvegetated area	-trail improvement -stormwater treatment	High
P34	Triple Falls Trail along Little River	-trail erosion -human/animal impact	-relocate/close trail -stormwater treatment -mechanical grading	High
P42	Stone Mountain Trail	-trail erosion	-revegetation -relocate/close trail -maintenance	High
P44	Stream at Switchback Trail	-erosion -unstable trail crossing	-crossing improvement -relocate/close trail -mechanical grading	High
P48	Fawn Lake	-missing vegetation -erosion -human/animal impact	-revegetation -human/animal exclusion -signs	High
P49	Power lines at Fawn Lake Road	-erosion -unvegetated area	-revegetation -mechanical grading	High

Table 3. Area of Concern Summary –Moderate Priority Sites (see Appendix F for detail about individual sites)

Site ID	Site Name	Primary Concerns/Deficiencies	Potential Solutions	Priority
P08	Drainage across Burnt Mountain Trail	-culvert, clogged and piping -streambank erosion	-crossing improvement -culvert repair	Moderate
P09	Drainage across Burnt Mountain Trail	-culvert, impaired -streambank erosion	-crossing improvement -culvert repair	Moderate
P13	Bridal Veil Falls	-erosion -human/animal impact -missing vegetation	-human exclusion -revegetation -signs	Moderate
P23	Stream at Reasonover Creek Trail	-culvert, clogged	-culvert repair -maintenance	Moderate
P29	Stream at Twin Oaks Trail	-trail crossing -sediment input -stormwater input	-crossing improvement -relocate/close trail	Moderate
P30	Briery Fork Creek at Briery Fork Creek Trail	-trail crossing -sediment input -human/animal impact	-crossing improvement -relocate/close trail -revegetation	Moderate

P31	Lake Dense	-human/animal impact -missing vegetation -water temperature	-relocate/close trail -revegetation -human/animal exclusion	Moderate
P32	Oak Tree Trail	-trail erosion	-relocate/close trail -revegetation	Moderate
P33	Grassy Creek Falls	-erosion -human/animal impact -missing vegetation	-human exclusion -revegetation -signs	Moderate
P35	Hooker Falls	-erosion -human/animal impact -missing vegetation	-revegetation -mechanical grading -human/animal exclusion	Moderate
P41	Tributary to Shoal Creek at Farmhouse Trail	-sediment input -stormwater input	-crossing improvement -relocate/close trail -maintenance	Moderate
P43	Stream at Switchback Trail	-culvert, piping -streambank erosion	-crossing improvement -culvert repair	Moderate
P45	Sky Valley Road at Jim Creek	-sediment input -stormwater input -bridge	-crossing improvement -maintenance	Moderate
P50	Stream at Cedar Rock Trail	-unstable trail crossing -sediment input -human/animal impact	-crossing improvement -relocate/close trail	Moderate
P51	Drainage at horse barn	-erosion -unvegetated area	-stormwater treatment -mechanical grading -revegetation	Moderate

Table 4. Area of Concern Summary – Low Priority Sites (see Appendix F for detail about individual sites)

Site ID	Site Name	Primary Concerns/Deficiencies	Potential Solutions	Priority
P01	Stream at Cannon Creek Trail	-trail/road crossing -sediment input	-crossing improvement -revegetation	Low
P02	Stream at Buckhorn Creek Road	-trail/road crossing -sediment input	-crossing improvement -revegetation	Low
P03	Stream at Pine Tree Trail	-trail/road crossing -sediment input -streambank erosion	-crossing improvement -revegetation	Low
P04	Drainage across Little River Trail	-trail/road crossing -sediment input	-crossing improvement	Low
P05	Drainage across Little River Trail	-trail/road crossing -sediment input	-crossing improvement	Low

P07	Culvert under Corn Mill Shoals Road	-sediment input -missing vegetation	-crossing improvement -revegetation	Low
P10	Drainage across Burnt Mountain Trail	-culvert, impaired -streambank erosion	-crossing improvement -culvert repair	Low
P11	Corn Mill Shoals Trail at Little River	-missing vegetation -human/animal impact	-crossing improvement -revegetation	Low
P12	Stream at Corn Mill Shoals Trail	-sediment input -stormwater input	-crossing improvement -maintenance	Low
P14	Stream at Shelter Rock Trail	-stormwater input -missing vegetation -human/animal impact	-human/animal exclusion -revegetation	Low
P15	Stream at Shelter Rock Trail	-stormwater input -missing vegetation -human/animal impact	-human/animal exclusion -revegetation	Low
P16	Horse watering at Barn Trail	-sediment input -missing vegetation -equine impact	-human/animal exclusion -revegetation -relocate/close trail	Low
P18	Fawn Lake outlet at Conservation Road	-culvert, impaired -sediment input	-culvert repair	Low
P19	Reasonover Creek at Reasonover Creek Trail	-erosion -human/animal impact -missing vegetation	-crossing improvement -revegetation	Low
P20	Drainage across Reasonover Creek Trail	-stormwater input -sediment input -erosion	-crossing improvement -revegetation	Low
P21	Reasonover Creek at Reasonover Creek Trail	-trail crossing -sediment input -human and equine impacts	-crossing improvement -revegetation	Low
P22	Stream at Reasonover Creek Trail	-trail crossing -human/animal impact -missing vegetation	-crossing improvement -revegetation	Low
P24	Stream at Turkey Knob Trail	-trail crossing -sediment input -erosion	-crossing improvement -relocate/close trail -revegetation	Low
P25	Tributary to Briery Fork Creek at Joanna Road	-trail crossing -sediment input -stormwater input	-crossing improvement -relocate/close trail	Low
P26	Tributary to Briery Fork Creek at Joanna Road	-trail crossing -sediment input -stormwater input	-crossing improvement -relocate/close trail	Low
P27	Stream at Grassy Meadow Trail	-trail crossing -sediment input -stormwater input	-crossing improvement	Low

P28	Stream at Joanna Road	-trail crossing -sediment input -stormwater input	-crossing improvement -relocate/close trail	Low
P36	Stream at Hickory Mountain Trail	-sediment input -stormwater input -erosion	-crossing improvement	Low
P37	Stream at Sandy Trail	-sediment input -erosion	-crossing improvement -relocate/close trail -revegetation	Low
P38	Stream at Tarkiln Branch Road	-missing vegetation	-revegetation	Low
P39	Horse watering at Tarkiln Branch Road	-sediment input -equine impact -missing vegetation	-relocate/close trail -revegetation -human/animal exclusion	Low
P40	Tributary to Shoal Creek at Shoal Creek Trail	-streambank erosion -missing vegetation	-revegetation	Low
P46	Plantation Trail at Sky Valley Road	-culvert, clogged and crushed	-relocate/close trail -culvert repair	Low
P47	Stream at Plantation Trail	-erosion -missing vegetation	-revegetation	Low

IV. RESTORATION PROJECT ELEMENTS

For the 10 High priority sites (both Stream and Area of Concern), additional information about existing conditions and potential restoration approaches is included as a narrative below. For the High priority stream sites (S02, S15, S17), conceptual design plans are included in Appendix G (sheets G1 through G3). Sheets G4 through G8 show typical riffle and pool cross-sections, longitudinal profiles, reference data, and planting information appropriate for these projects.

Due to changing conditions at sites following runoff events and trail/road use, it is recommended that site-specific engineering solutions be developed for each restoration project at the time of implementation to appropriately address existing conditions.

S02, Little River above Bridal Veil Falls

Approximately 1860 feet of the Little River above Bridal Veil Falls is impaired as a result of eroding streambanks, poor floodplain access, lacking vegetation, and sedimentation from adjacent trails and bare areas. For part of this reach, the Little River Trail is within the riparian buffer, and, at times, along the top of the left stream bank. Some bare areas and eroding banks do exist between the trail and River. Additionally, a large part of this reach flows through a right-of-way for a power line, resulting in poor riparian vegetation. Finally, a closed trail crosses the right-of-way, connecting the Little River Trail to private property adjacent to Bridal Veil Falls. This trail, which is severely eroding and delivering sediment to the river, is still used by hikers and bikers, despite efforts to close it. A potential restoration approach would include stabilizing eroding streambanks through grading, matting, and revegetation, as well as installation of log and boulder structures in the streambed to protect streambanks, turn flow around sharp bends, and improve in-stream habitat. The Little River Trail would be partially relocated outside of the riparian buffer, and the closed trail would be permanently closed and stabilized with ground cover.

S15, Shoal Creek

Over 2100 feet of Shoal Creek has been identified as a potential restoration project due to vertical and lateral instability, poor vegetation, trail impacts, and poor floodplain access. The Shoal Creek Trail is within the riparian buffer of Shoal Creek for much of this reach, resulting in impacts to the riparian buffer and the trail serving as a source of stormwater and sediment to the stream. Additionally, an old road appears to exist to the right of a portion of the stream, which adds to the bare areas. The stream is generally incised and entrenched, with a head cut evident at the top of the reach. While the stream is not perennial at the location of the head cut, it may continue to migrate upvalley toward the power line right-of-way. The restoration approach would not be uniform over the entire length of the stream, as conditions differ throughout the reach. The most intensive restoration would be needed near the top of the reach, with grade control structures installed to raise the streambed and stabilize the head cut. Areas with eroding banks and no floodplain would be graded to an appropriate cross-section, including a floodplain at bankfull elevation. The Shoal Creek Trail would be relocated to the east, and bare areas would be planted with appropriate vegetation.

S17, Little River at Hooker Falls Road

Between the Hooker Falls parking lot and Hooker Falls is a very heavily used footpath, Hooker Falls Road. For approximately 800 feet, the road is very near the Little River, and provides multiple opportunities for access to the river. Multiple informal footpaths have been created to connect the road to the river, resulting in bare riparian areas and impacts to vegetation and streambanks. Additionally, a large bare area exists where a natural gas line crosses perpendicularly to the river and road. The right-of-way for the gas line is covered in grass and bare soil, and provides a popular point for people to access the river. Any restoration along this 800 feet of the Little River would be heavily dependent on excluding human access from the most vulnerable streambanks. A potential approach would include moving Hooker Falls Road far enough to the north that the river could not be seen, and permanently abandoning the existing road and connecting trails. Revegetation of streambanks and the gas line right-of-way would be needed.

P06, Bridge/crossing near Little River

The Little River Trail crosses a tributary to the Little River, with both a foot bridge and ford. The stream channel at the ford is over-widened, poorly vegetated, and contains a large amount of fine sediment. The combination of a bridge and ford has resulted in an unnecessarily large impact to the bed and banks of the stream. A potential solution would include constructing a new bridge or ford, though not both. In-stream structures, such as boulder j-hooks, could be designed to provide grade control downstream of a ford, protect streambanks, and promote sediment transport. Appropriate riparian vegetation could be installed in currently bare areas.

P17, Airstrip Trail below Airstrip

The asphalt Airstrip is approximately 2.5 acres in area, and surrounded by an even larger area of maintained grass. The large amount of impervious surface serves as a major source of stormwater during precipitation events. Two inches of rainfall on the airstrip would generate approximately 125,000 gallons of stormwater runoff. This runoff would flow off the airstrip in different areas, and would not necessarily all be concentrated flow. However, an area of concentrated flow does exist to the west of the airstrip. A gully has formed as a result of stormwater runoff. This gully is visible from the Airstrip Trail, and crosses the trail at a switchback. Fixing this problem would require eliminating the source of the water by grading in the vicinity of the airstrip to promote drainage via diffuse flow to stable, vegetated areas. Additionally, stormwater best management practices (BMPs), such as bioretention areas, could be installed to promote infiltration and treatment of stormwater runoff. The existing gully is in a forested area and would likely revegetate over time if its water supply was eliminated.

P34, Triple Falls Trail along Little River

The Triple Falls Trail between Little River and the vicinity of the Triple Falls picnic shelter is wide, steep, and eroding along several hundred feet of trail. The trail contains gullies, and appears to convey water during heavy rainfall, while serving as a source of sediment to the Little River. Opportunities to relocate the trail should be considered. If the trail remains in its current location, BMPs appropriate for steep gravel roads should be implemented.

P42, Stone Mountain Trail

The Stone Mountain Trail, along much of its length, is steep and severely eroding. The trail bed conveys water during heavy rainfall and serves as a major source of sediment to a stream it crosses, a tributary to Jim Creek. One option for water quality improvement is to properly abandon the trail and restore vegetation and ground cover to eroded areas. If the trail remains in use, improvements should be made to reduce sedimentation, such as the installation of switchbacks, water bars, sediment traps, and broad-based dips.

P44, Stream at Switchback Trail

A large hole exists adjacent to the Switchback Trail at a stream crossing. During heavy rainfall events, water flows across the trail and drops several feet vertically over a head cut. The Switchback Trail could be re-routed to the north to avoid this location. The existing hole will likely continue to grow in size and serve as a sediment source, as the head cut slowly migrates upvalley. A potential solution includes stabilizing the area through grading and installation of boulder grade control structures, coarse rock backfill, and appropriate deep-rooted vegetation.

P48, Fawn Lake

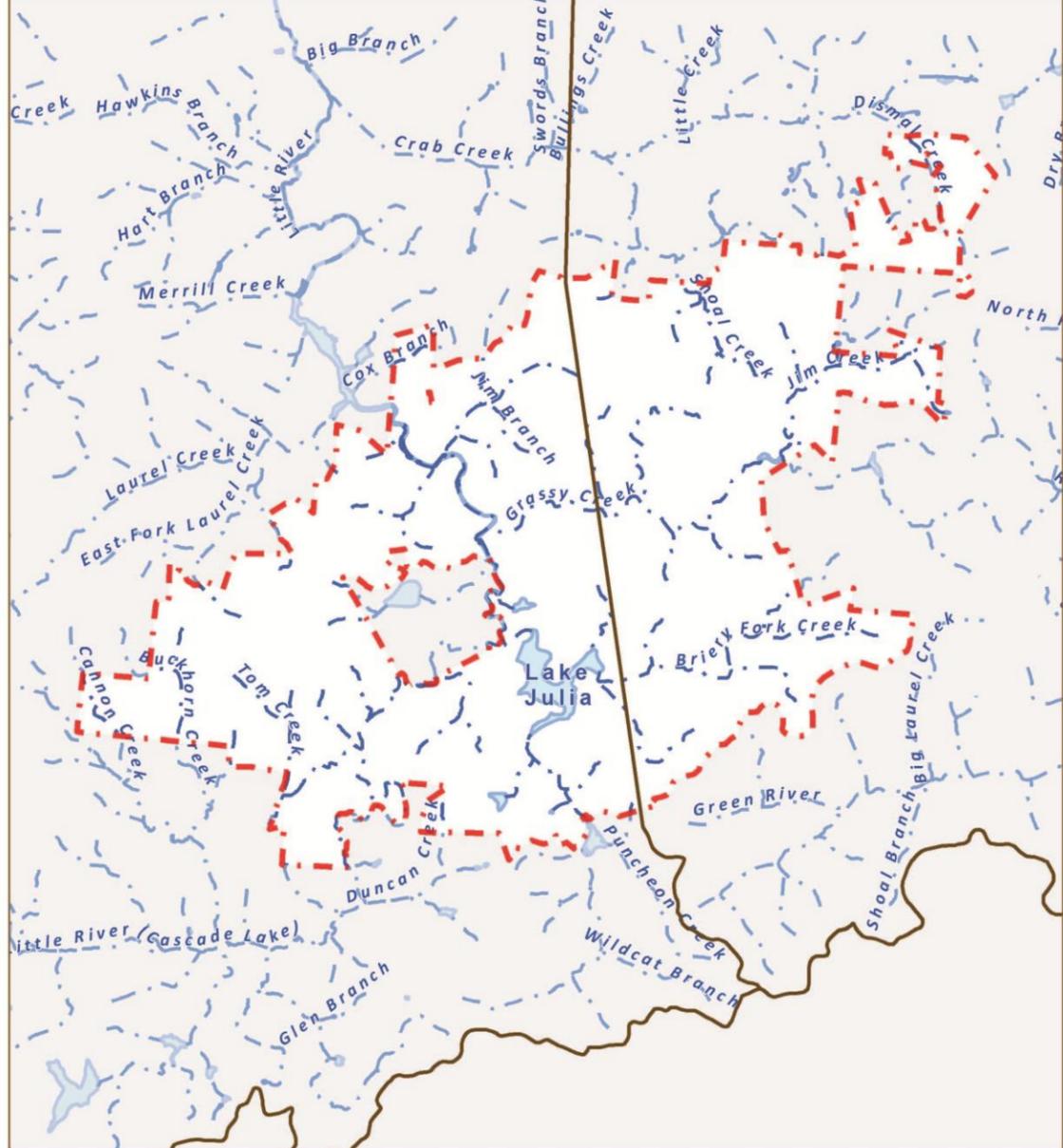
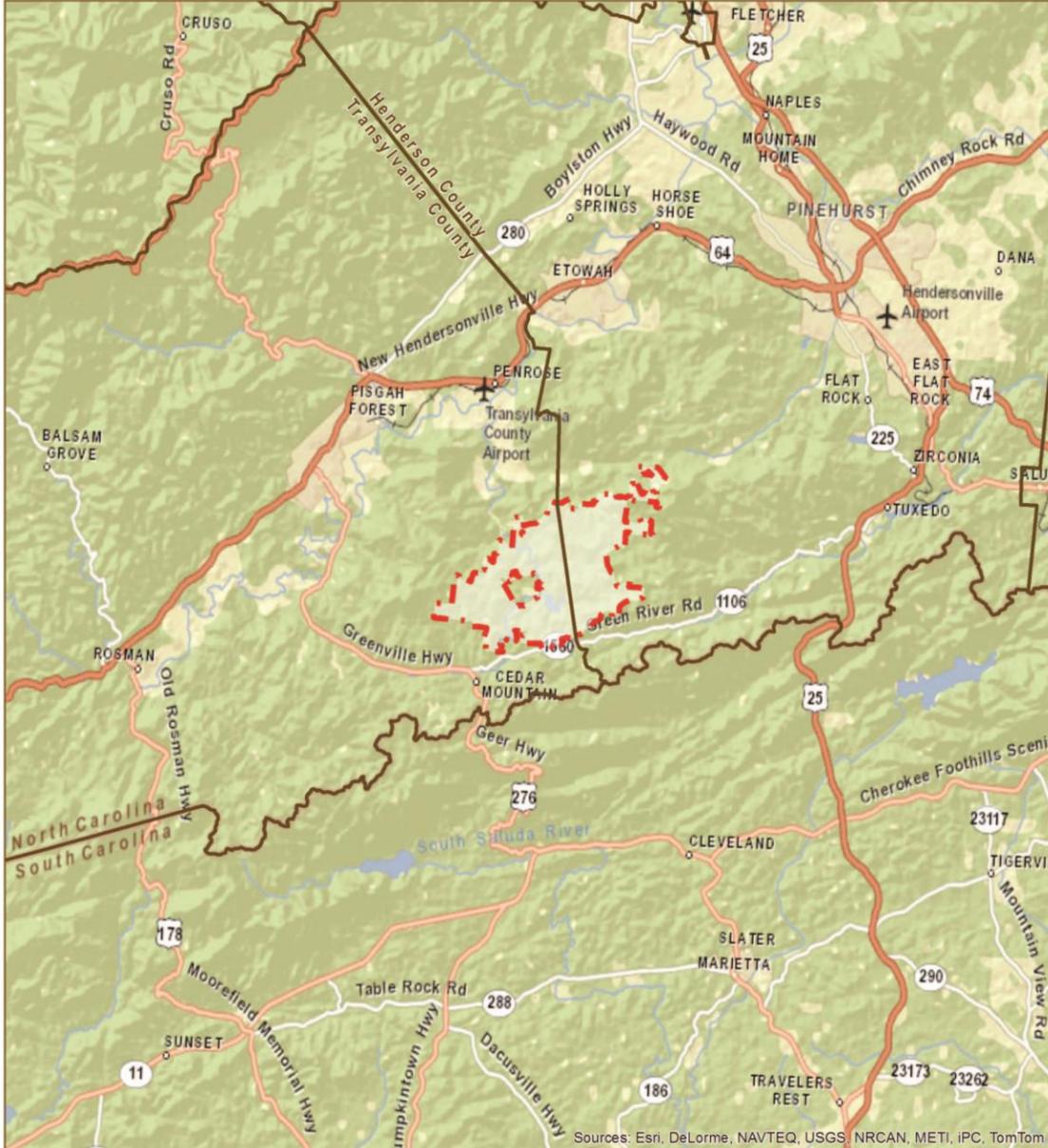
The shoreline of Fawn Lake appears to be a popular spot for swimming and picnicking. The portion of the shoreline used for water access is covered with grass and bare dirt. This serves as a sediment source to lake during times of rainfall or heavy human access. Restricting access to a smaller area, while restoring native vegetation to a portion of the shoreline, could reduce sedimentation to the lake. The remaining area designated for lake access could be planted and maintained with a thick stand of grass, potentially combined with hardscaping elements such as geogrid, concrete pavers, and terraces.

P49, Power lines at Fawn Lake Road

To the east of the Fawn Lake parking area, Fawn Lake Road crosses under power lines. On the north side of the road is a tall, steep bank that is actively eroding. Fine sediment from this bank is conveyed by a roadside swale to a nearby waterway. This area of upland erosion could be improved by grading the road bank to a stable slope and planting vegetation appropriate for under a power line. The roadside swale could be regraded to remove existing sediment and provide a trap for future sediment.

APPENDIX A

Location and Property Maps (from NCFS)



APPENDIX B

Blank Field Assessment Sheets

Stream Condition – Site:

Map Grid Location: _____ Site visit date/ team): _____ Drainage Area (Sq. Mi.): _____
 Stream name & Location: _____
 Streambed Substrate: _____ Length (ft): _____ Width (ft): _____

Stream Condition and Function: Score from 0 to 4 indicating natural stream integrity and health
 (circle contributing factors): 0 = *very poor*; 1 = *poor*; 2 = *fair*; 3 = *good*; 4 = *excellent*

1. Site and Watershed Conditions _____

- stormwater input
- trampled banks
- trail crossing
- bridge/culvert/armoring
- sediment input
- equine/dog impacts
- trail in buffer
- utilities

2. Channel Morphology and Condition _____

- overwide
- straightened
- head-cutting
- high bed scour
- incised
- eroding banks
- lack of bedform diversity
- excessive sediment deposition

3. Floodplain Morphology _____

- incised channel
- floodplain fill/ levees
- entrenched channel
- irregular/ obstructed floodplain

4. Vegetation _____

- narrow buffer width
- poor overstory/tree cover
- invasive plants (banks/floodplain)
- bare areas/mineral soil (banks/floodplain)

5. Habitat _____

- lack of woody debris
- lack of diverse bedform/ flow
- poor water quality (turbid, algae, temperature)
- lack of fine roots, leaf packs, coarse substrate

Score (of 20) and Rating (Poor 0-7; Fair 8-12; Good 13-17; Excellent 18-20) _____

Potential Solutions

- relocate/close trail
- vegetation planting
- in-stream structures
- preservation/ exclusion
- maintenance
- trail crossing improvement
- mechanical grading
- watershed improvements
- culvert rehabilitation/ replacement
- signs

Comments

Area of Concern – Site:

Map Grid Location: _____ Site visit date/ team): _____ Drainage Area (Sq. Mi.): _____
 Name & Location: _____

1. Culvert (diameter/material/length): _____

- clogged
- crushed
- lack of natural bed
- safety hazard
- aquatic organism passage/ perched
- erosion (upstream/ downstream)
- piping
- overtopping

2. Trail/ Road Impact (trail/ road name): _____

- stormwater input
- bridge
- unstable trail crossing
- safety hazard
- missing vegetation
- sediment input
- utilities
- erosion
- human impact (hiking/biking)
- equine/dog impacts

3. Upland/ Stormwater

- nonpoint source pollution
- pollutant point source
- upland erosion
- unvegetated upland area

4. Lake/Pond/ Reservoir (reservoir name): _____

- erosion
- equine impact
- safety hazard
- lack of vegetation
- human impact (hiking/biking)
- water quality (temperature, algae, geese, fecal)

5. Other Problem Area(s) (list contributing factors)

Potential Solutions

- relocate trail/close trail/road
- vegetation/ shoreline planting
- stormwater treatment
- human/ animal exclusion
- signs
- maintenance
- trail/road crossing improvement
- mechanical grading
- animal watering
- culvert rehabilitation/ replacement
- culvert daylighting
- bridge replacement/improvement

Comments

APPENDIX C

GIS Feature Class Structure

Feature Class Structure Stream Condition

FeatureClassName	StreamConditions
DatasetType	FeatureClass
Description	Information included in this feature was field collected between the dates of 03/16/2015 - 08/31/15 using handheld GPS units, then compiled, edited, and finalized to this feature class.
FeatureDataset	Sites
Tags	null
ShapeType	Polyline
FeatureType	Simple
AliasName	StreamConditions
HasM	false
HasZ	false
SubtypeFieldName	null
DefaultSubtype	null
DSID	38

Fields												
FieldName	Type	Length	Description	AliasName	DomainName	DefaultValue	IsNullable	Precision	Scale	Required	DomainFixed	
SITE_ID	String	4	SITE_ID	Site ID	null	null	true	0	0	null	null	
NAME_LOCATION	String	200	NAME_LOCATION	Name & Location	null	null	true	0	0	null	null	
TEAM	String	50	TEAM	Team	null	null	true	0	0	null	null	
DATE	Date	8	DATE	Date	null	null	true	0	0	null	null	
DRAINAGE_AREA	String	8	DRAINAGE_AREA	Drainage Area (Sq. Mi.)	null	null	true	0	0	null	null	
STREAMBED_SAND	String	100	STREAMBED_SAND	Streambed Substrate - Sand	YesOrNo	null	true	0	0	null	null	
STREAMBED_BOULDER	String	50	STREAMBED_BOULDER	Streambed Substrate - Boulder	YesOrNo	null	true	0	0	null	null	
STREAMBED_GRAVEL	String	50	STREAMBED_GRAVEL	Streambed Substrate - Gravel	YesOrNo	null	true	0	0	null	null	
STREAMBED_SILT	String	50	STREAMBED_SILT	Streambed Substrate - Silt	YesOrNo	null	true	0	0	null	null	
STREAMBED_CLAY	String	50	STREAMBED_CLAY	Streambed Substrate - Clay	YesOrNo	null	true	0	0	null	null	
STREAMBED_COBBLE	String	50	STREAMBED_COBBLE	Streambed Substrate - Cobble	YesOrNo	null	true	0	0	null	null	
STREAMBED_BEDROCK	String	50	STREAMBED_BEDROCK	Streambed Substrate - Bedrock	YesOrNo	null	true	0	0	null	null	
STREAMBED_NOTES	String	200	STREAMBED_NOTES	Streambed Substrate - Additional Info/ Notes	null	null	true	0	0	null	null	
BANKFULL_WIDTH	String	3	BANKFULL_WIDTH	Bankfull Width	null	null	true	0	0	null	null	
STORMWATER_INPUT_1	String	50	STORMWATER_INPUT_1	Site & Watershed Cond - Stormwater Input	YesOrNo	null	false	0	0	null	null	
SEDIMENT_INPUT_1	String	50	SEDIMENT_INPUT_1	Site & Watershed Cond -Sediment Input	YesOrNo	null	false	0	0	null	null	
TRAMPLED_BANKS_1	String	50	TRAMPLED_BANKS_1	Site & Watershed Cond -Trampled Banks	YesOrNo	null	false	0	0	null	null	
EQUINE_IMPACTS_1	String	50	EQUINE_IMPACTS_1	Site & Watershed Cond -Equine Impacts	YesOrNo	null	false	0	0	null	null	
TRAIL_CROSSING_1	String	50	TRAIL_CROSSING_1	Site & Watershed Cond -Trail Crossing	YesOrNo	null	false	0	0	null	null	
TRAIL_IN_BUFFER_1	String	50	TRAIL_IN_BUFFER_1	Site & Watershed Cond -Trail in Buffer	YesOrNo	null	false	0	0	null	null	
BRIDGE_CULVERT_ARMORING_1	String	50	BRIDGE_CULVERT_ARMORING_1	Site & Watershed Cond -Bridge/ Culver/ Armoring	YesOrNo	null	false	0	0	null	null	
UTILITIES_1	String	50	UTILITIES_1	Site & Watershed Cond -Utilities	YesOrNo	null	false	0	0	null	null	
SITE_WATER_CONDITION_SCORE_1	SmallInteger	2	SITE_WATER_CONDITION_SCORE_1	Site & Watershed Cond - Score	IndScore	null	false	0	0	null	null	
OVERWIDE_2	String	50	OVERWIDE_2	Channel Morphology - Overwide	YesOrNo	null	false	0	0	null	null	
INCISED_2	String	50	INCISED_2	Channel Morphology - Incised	YesOrNo	null	false	0	0	null	null	
STRAIGHTENED_2	String	50	STRAIGHTENED_2	Channel Morphology - Straightened	YesOrNo	null	false	0	0	null	null	
ERODING_BANKS_2	String	50	ERODING_BANKS_2	Channel Morphology - Eroding Banks	YesOrNo	null	false	0	0	null	null	
HEAD_CUTTING_2	String	50	HEAD_CUTTING_2	Channel Morphology - Head Cutting	YesOrNo	null	false	0	0	null	null	
LACK_OF_BEDFORM_DIVERSITY_2	String	50	LACK_OF_BEDFORM_DIVERSITY_2	Channel Morphology - Lack of Bedform Diversity	YesOrNo	null	false	0	0	null	null	
HIGH_BED_SCOUR_2	String	50	HIGH_BED_SCOUR_2	Channel Morphology - High Bed Scour	YesOrNo	null	false	0	0	null	null	
EXCESSIVE_SEDIMENT_DEPOSITION_2	String	50	EXCESSIVE_SEDIMENT_DEPOSITION_2	Channel Morphology - Excessive Sediment Deposition	YesOrNo	null	false	0	0	null	null	
CHANNEL_MORPHOLOGY_SCORE_2	SmallInteger	2	CHANNEL_MORPHOLOGY_SCORE_2	Channel Morphology - Score	IndScore	null	false	0	0	null	null	
INCISED_CHANNEL_3	String	50	INCISED_CHANNEL_3	Floodplain Morphology - Incised Channel	YesOrNo	null	false	0	0	null	null	
ENTRENCHED_CHANNEL_3	String	50	ENTRENCHED_CHANNEL_3	Floodplain Morphology - Entrenched Channel	YesOrNo	null	false	0	0	null	null	
FLOODPLAIN_FILL_LEVEES_3	String	50	FLOODPLAIN_FILL_LEVEES_3	Floodplain Morphology - Floodplain Fill/ Levees	YesOrNo	null	false	0	0	null	null	
IRREGULAR_OBSTRUCTED_FLOODPLAIN_3	String	50	IRREGULAR_OBSTRUCTED_FLOODPLAIN_3	Floodplain Morphology - Irregular/ Obstructed Floodplain	YesOrNo	null	false	0	0	null	null	
FLOODPLAIN_MORPHOLOGY_SCORE_3	SmallInteger	2	FLOODPLAIN_MORPHOLOGY_SCORE_3	Floodplain Morphology - Score	IndScore	null	false	0	0	null	null	
NARROW_BUFFER_WIDTH_4	String	50	NARROW_BUFFER_WIDTH_4	Vegetation - Narrow Buffer Width	YesOrNo	null	false	0	0	null	null	
INVASIVE_PLANTS_4	String	50	INVASIVE_PLANTS_4	Vegetation - Invasive Plants (banks/ floodplain)	YesOrNo	null	false	0	0	null	null	
POOR_OVERSTORY_4	String	50	POOR_OVERSTORY_4	Vegetation - Poor Overstory/ Tree Cover	YesOrNo	null	false	0	0	null	null	
BARE_AREAS_MINERAL_4	String	50	BARE_AREAS_MINERAL_4	Vegetation - Bare Areas/ Mineral Soil	YesOrNo	null	false	0	0	null	null	
VEGETATION_SCORE_4	SmallInteger	2	VEGETATION_SCORE_4	Vegetation - Score	IndScore	null	false	0	0	null	null	
LACK_OF_WOODY_DEBRIS_5	String	50	LACK_OF_WOODY_DEBRIS_5	Habitat - Lack of Woody Debris	YesOrNo	null	false	0	0	null	null	
POOR_WATER_QUALITY_5	String	50	POOR_WATER_QUALITY_5	Habitat - Poor Water Quality (turbid, algae, temp)	YesOrNo	null	false	0	0	null	null	
LACK_OF_DIVERSE_BEDFORM_FLOW_5	String	50	LACK_OF_DIVERSE_BEDFORM_FLOW_5	Habitat - Lack of Diverse Bedform/ Flow	YesOrNo	null	false	0	0	null	null	
LACK_OF_FINE_ROOTS_LEAFPACKS_COARSE_SUB_5	String	50	LACK_OF_FINE_ROOTS_LEAFPACKS_COARSE_SUB_5	Habitat - Lack of Fine Roots, Leaf Packs, Coarse Substrate	YesOrNo	null	false	0	0	null	null	
HABITAT_SCORE_5	SmallInteger	2	HABITAT_SCORE_5	Habitat - Score	IndScore	null	false	0	0	null	null	
TOTAL_SCORE	SmallInteger	2	TOTAL_SCORE	Total Score	TotalScore	null	false	0	0	null	null	
SOLUTION_RELOCATE_TRAIL	String	50	SOLUTION_RELOCATE_TRAIL	Solution - Relocate Trail	YesOrNo	null	true	0	0	null	null	
SOLUTION_IMPROVE_CROSSING	String	50	SOLUTION_IMPROVE_CROSSING	Solution - Trail Crossing Improvement	YesOrNo	null	true	0	0	null	null	
SOLUTION_PLANTING	String	50	SOLUTION_PLANTING	Solution - Vegetation Planting	YesOrNo	null	true	0	0	null	null	
SOLUTION_MECH_GRADING	String	50	SOLUTION_MECH_GRADING	Solution - Mechanical Grading	YesOrNo	null	true	0	0	null	null	
SOLUTION_INSTREAM_STRUCT	String	50	SOLUTION_INSTREAM_STRUCT	Solution - In-stream Structures	YesOrNo	null	true	0	0	null	null	
SOLUTION_WATERSHED_IMPROV	String	50	SOLUTION_WATERSHED_IMPROV	Solution - Watershed Improvements	YesOrNo	null	true	0	0	null	null	
SOLUTION_PRESERVATION_EXCLUSION	String	50	SOLUTION_PRESERVATION_EXCLUSION	Solution - Preservation/ Exclusion	YesOrNo	null	true	0	0	null	null	
SOLUTION_CULVERT_REHAB_REPLACE	String	50	SOLUTION_CULVERT_REHAB_REPLACE	Solution - Culvert Rehab/ Replacement	YesOrNo	null	true	0	0	null	null	
SOLUTION_MAINTENANCE	String	50	SOLUTION_MAINTENANCE	Solution - Maintenance	YesOrNo	null	true	0	0	null	null	
SOLUTION_SIGNS	String	50	SOLUTION_SIGNS	Solution - Signs	YesOrNo	null	true	0	0	null	null	
COMMENTS	String	300	COMMENTS	COMMENTS	null	null	true	0	0	null	null	

Feature Class Structure Area of Concern

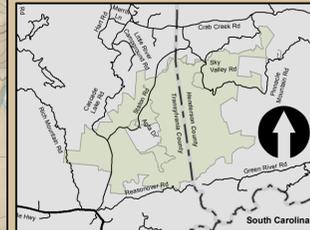
FeatureClassName	AreasOfConcern
DatasetType	FeatureClass
Description	Information included in this feature was field collected between the dates of 03/16/2015 - 08/31/15 using handheld GPS units, then compiled, edited, and finalized to this feature class.
FeatureDataset	Sites
Tags	null
ShapeType	Point
FeatureType	Simple
AliasName	Problem Areas Assessed
HasM	false
HasZ	false
SubtypeFieldName	null
DefaultSubtype	null
DSID	34

Fields											
FieldName	Type	Length	Description	AliasName	DomainName	DefaultValue	IsNullabled	Precision	Scale	Required	DomainFixed
SITE_ID	String	4	SITE_ID	Site ID	null	null	true	0	0	0	null
TYPE	String	50	TYPE	type	TypeOfIssue	null	true	0	0	0	null
DATE_COLLECTED	Date	8	DATE_COLLECTED	Date of Collection	null	null	true	0	0	0	null
COLLECTED_BY	String	8	COLLECTED_BY	Data Collected By (Initials Only)	null	null	true	0	0	0	null
NAME_LOCATION	String	200	NAME_LOCATION	Name & Location	null	null	true	0	0	0	null
DRAINAGE_AREA	String	50	DRAINAGE_AREA	Drainage Area (Sq. Mi.)	null	null	true	0	0	0	null
CULVERT_DIA_1	Double	8	CULVERT_DIA_1	Culvert - Diameter (inches)	null	null	true	0	0	0	null
CULVERT_MATERIAL_1	String	100	CULVERT_MATERIAL_1	Culvert - Material	CulvertMaterial	null	true	0	0	0	null
CULVERT_LENGTH_1	Double	8	CULVERT_LENGTH_1	Culvert - Length (feet)	null	null	true	0	0	0	null
CLOGGED_1	String	50	CLOGGED_1	Culvert - Clogged	YesOrNo	null	true	0	0	0	null
AQUATIC_ORGANISM_PASSAGE_1	String	50	AQUATIC_ORGANISM_PASSAGE_1	Culvert - Aquatic Organism Passage/ Perched	YesOrNo	null	true	0	0	0	null
CRUSHED_1	String	50	CRUSHED_1	Culvert - Crushed	YesOrNo	null	true	0	0	0	null
EROSION_1	String	50	EROSION_1	Culvert - Erosion (upstream / downstream)	YesOrNo	null	true	0	0	0	null
LACK_OF_NATURAL_BED_1	String	50	LACK_OF_NATURAL_BED_1	Culvert - Lack of Natural Bed	YesOrNo	null	true	0	0	0	null
PIPING_1	String	50	PIPING_1	Culvert - Piping	YesOrNo	null	true	0	0	0	null
SAFETY_HAZARD_1	String	50	SAFETY_HAZARD_1	Culvert - Safety Hazard	YesOrNo	null	true	0	0	0	null
OVERTOPPING_1	String	50	OVERTOPPING_1	Culvert - Overtopping	YesOrNo	null	true	0	0	0	null
STORMWATER_IMPACT_2	String	50	STORMWATER_IMPACT_2	Trail / Road Impact - Stormwater Impact	YesOrNo	null	true	0	0	0	null
SEDIMENT_INPUT_2	String	50	SEDIMENT_INPUT_2	Trail / Road Impact - Sediment Input	YesOrNo	null	true	0	0	0	null
BRIDGE_2	String	50	BRIDGE_2	Trail / Road Impact - Bridge	YesOrNo	null	true	0	0	0	null
UTILITIES_2	String	50	UTILITIES_2	Trail / Road Impact - Utilities	YesOrNo	null	true	0	0	0	null
UNSTABLE_TRAIL_XING_2	String	50	UNSTABLE_TRAIL_XING_2	Trail / Road Impact - Unstable Trail Crossing	YesOrNo	null	true	0	0	0	null
EROSION_2	String	50	EROSION_2	Trail / Road Impact - Erosion	YesOrNo	null	true	0	0	0	null
TRAIL_SAFETY_HAZARD_2	String	50	TRAIL_SAFETY_HAZARD_2	Trail / Road Impact - Safety Hazard	YesOrNo	null	true	0	0	0	null
HUMAN_IMPACT_2	String	50	HUMAN_IMPACT_2	Trail / Road Impact - Human Impact	YesOrNo	null	true	0	0	0	null
MISSING_VEGETATION_2	String	50	MISSING_VEGETATION_2	Trail / Road Impact - Missing Vegetation	YesOrNo	null	true	0	0	0	null
EQUINE_IMPACTS_2	String	50	EQUINE_IMPACTS_2	Trail / Road Impact - Equine/ Dog Impacts	YesOrNo	null	true	0	0	0	null
TRAIL_RD_NAME_2	String	100	TRAIL_RD_NAME_2	Trail / Road Impact - Name	null	null	true	0	0	0	null
NONPOINT_SOURCE_POLLUTION_3	String	50	NONPOINT_SOURCE_POLLUTION_3	Upland Stormwater - Nonpoint Source Pollution	YesOrNo	null	true	0	0	0	null
UPLAND_EROSION_3	String	50	UPLAND_EROSION_3	Upland Stormwater - Upland Erosion	YesOrNo	null	true	0	0	0	null
POLLUTANT_POINT_SOURCE_3	String	50	POLLUTANT_POINT_SOURCE_3	Upland Stormwater - Pollutant Point Source	YesOrNo	null	true	0	0	0	null
UNVEG_UPLAND_AREA_3	String	50	UNVEG_UPLAND_AREA_3	Upland Stormwater - Unvegetated Upland Area	YesOrNo	null	true	0	0	0	null
LAKE_POND_RESERVOIR_NAME_4	String	100	LAKE_POND_RESERVOIR_NAME_4	Pond etc. - Name	null	null	true	0	0	0	null
POND_EROSION_4	String	50	POND_EROSION_4	Pond etc. - Erosion	YesOrNo	null	true	0	0	0	null
LACK_VEG_4	String	50	LACK_VEG_4	Pond etc. - Lack of Vegetation	YesOrNo	null	true	0	0	0	null
EQUINE_IMPACT_4	String	50	EQUINE_IMPACT_4	Pond etc. - Equine Impact	YesOrNo	null	true	0	0	0	null
HUMAN_IMPACT_4	String	50	HUMAN_IMPACT_4	Pond etc. - Human Impact	YesOrNo	null	true	0	0	0	null
POND_HAZARD_4	String	50	POND_HAZARD_4	Pond etc. - Safety Hazard	YesOrNo	null	true	0	0	0	null
WATER_QUALITY_4	String	50	WATER_QUALITY_4	Pond etc. - Water Quality	YesOrNo	null	true	0	0	0	null
OTHER_PROBLEMS	String	350	OTHER_PROBLEMS	Other Problem Areas	null	null	true	0	0	0	null
SOLUTION_RELOCATE_TRL_RD	String	50	SOLUTION_RELOCATE_TRL_RD	Solution - Relocate or close Trail / Road	YesOrNo	null	true	0	0	0	null
SOLUTION_CROSSING_IMPROVEMENT	String	50	SOLUTION_CROSSING_IMPROVEMENT	Solution - Trail / Road Crossing Improvement	YesOrNo	null	true	0	0	0	null
SOLUTION_PLANTING	String	50	SOLUTION_PLANTING	Solution - Vegetation / Shoreline Planting	YesOrNo	null	true	0	0	0	null
SOLUTION_MECH_GRADING	String	50	SOLUTION_MECH_GRADING	Solution - Mechanical Grading	YesOrNo	null	true	0	0	0	null
SOLUTION_STORMWATER_TREATMENT	String	50	SOLUTION_STORMWATER_TREATMENT	Solution - Stormwater Treatment	YesOrNo	null	true	0	0	0	null
SOLUTION_ANIMAL_WATERING	String	50	SOLUTION_ANIMAL_WATERING	Solution - Animal Watering	YesOrNo	null	true	0	0	0	null
SOLUTION_HUMAN_ANIMAL_EXC	String	50	SOLUTION_HUMAN_ANIMAL_EXC	Solution - Human / Animal Exclusion	YesOrNo	null	true	0	0	0	null
SOLUTION_CULVERT_REHAB_REPLACE	String	50	SOLUTION_CULVERT_REHAB_REPLACE	Solution - Culvert Rehabilitation / Replacement	YesOrNo	null	true	0	0	0	null
SOLUTION_SIGNS	String	50	SOLUTION_SIGNS	Solution - Signs	YesOrNo	null	true	0	0	0	null
SOLUTION_CULVERT_DAYLIGHT	String	50	SOLUTION_CULVERT_DAYLIGHT	Solution - Culvert Daylighting	YesOrNo	null	true	0	0	0	null
SOLUTION_MAINTENANCE	String	50	SOLUTION_MAINTENANCE	Solution - Maintenance	YesOrNo	null	true	0	0	0	null
SOLUTION_BRIDGE_REP_IMP	String	50	SOLUTION_BRIDGE_REP_IMP	Solution - Bridge Replacement/ Improvement	YesOrNo	null	true	0	0	0	null
COMMENTS	String	350	COMMENTS	COMMENTS	null	null	true	0	0	0	null

APPENDIX D

DuPont SRF Base Map

Dupont State Recreational Forest Base Map



Legend

- Problem Area
- Assessed Streams
- Trails
- Roads
- Streams
- Major Contour
- Minor Contour
- Waterfalls
- Parking
- DuPont State Forest

Prepared For:
North Carolina Forest Service



WATER RESOURCES RESTORATION MASTER PLAN

Date: 11/09/15

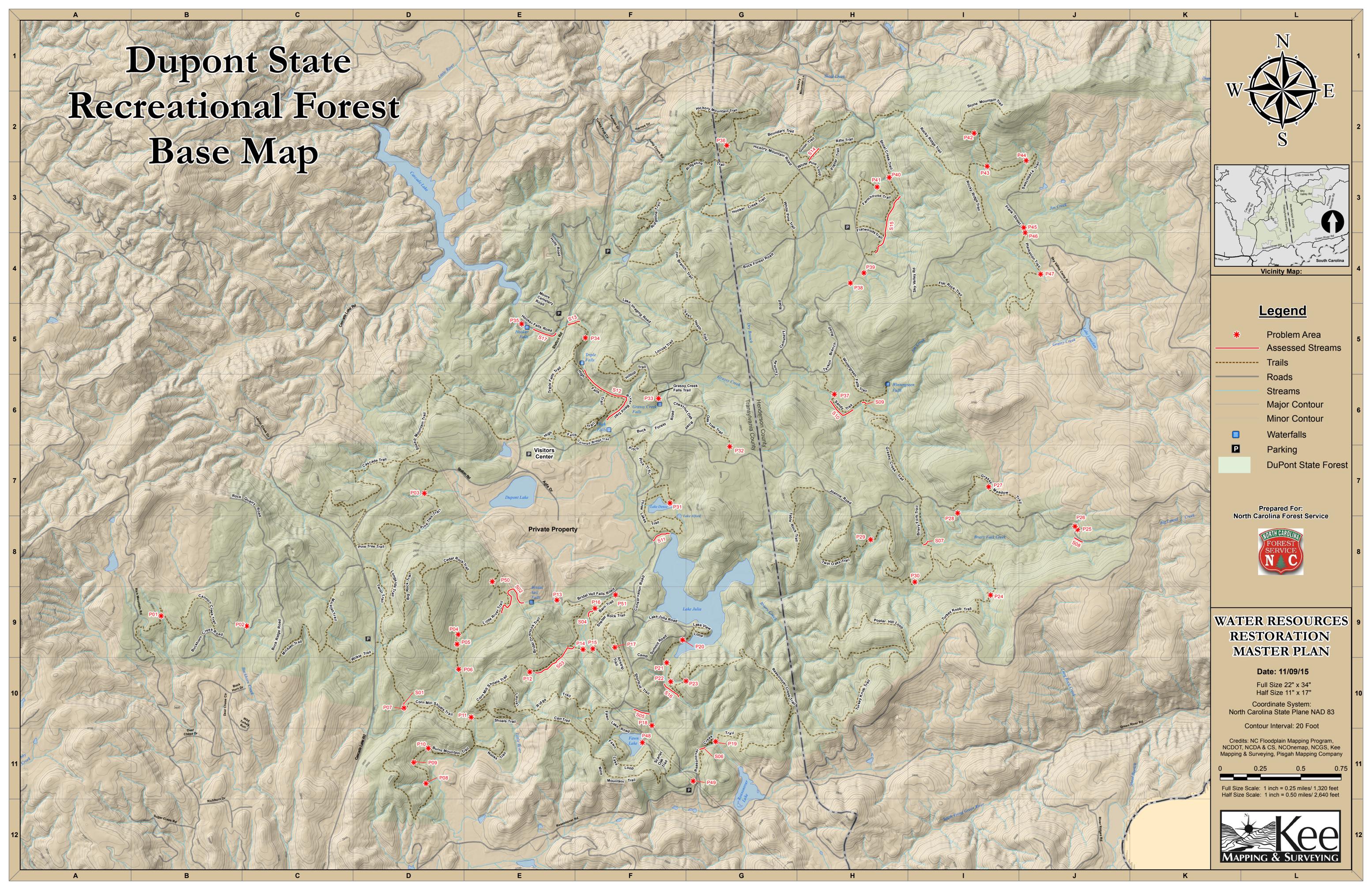
Full Size 22" x 34"
Half Size 11" x 17"

Coordinate System:
North Carolina State Plane NAD 83

Contour Interval: 20 Foot

Credits: NC Floodplain Mapping Program,
NCDOT, NCDA & CS, NCOneMap, NCGS, Kee
Mapping & Surveying, Pisgah Mapping Company

0 0.25 0.5 0.75
Full Size Scale: 1 inch = 0.25 miles / 1,320 feet
Half Size Scale: 1 inch = 0.50 miles / 2,640 feet



APPENDIX E

Stream Condition Assessments

Stream Condition – Site: S01

Map Grid Location: D10 Site visit date/ team): 4/13/15 / BK, JZ Drainage Area (Sq. Mi.): 0.89

Stream name & Location: Stream along Corn Mill Shoals Trail

Streambed Substrate: Sand / Gravel Length (ft): +/- 235 Bankfull Width (ft): +/- 6

Stream Condition and Function: Score from 0 to 4 indicating natural stream integrity and health (circle contributing factors): 0 = *very poor*; 1 = *poor*; 2 = *fair*; 3 = *good*; 4 = *excellent*

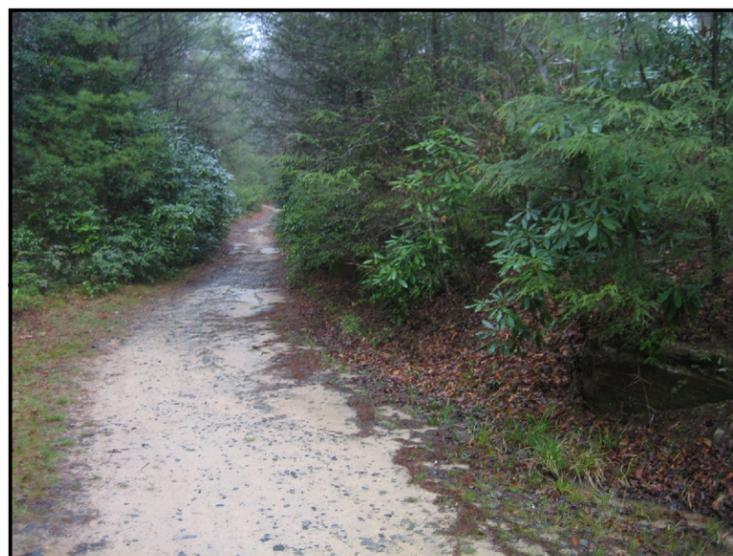
1. Site and Watershed Conditions	2
<input type="checkbox"/> stormwater input <input type="checkbox"/> trampled banks <input checked="" type="checkbox"/> trail crossing <input checked="" type="checkbox"/> bridge/culvert/armoring	<input checked="" type="checkbox"/> sediment input <input type="checkbox"/> equine/dog impacts <input checked="" type="checkbox"/> trail in buffer <input type="checkbox"/> utilities
2. Channel Morphology and Condition	3
<input type="checkbox"/> overwide <input type="checkbox"/> straightened <input type="checkbox"/> head-cutting <input type="checkbox"/> high bed scour	<input type="checkbox"/> incised <input type="checkbox"/> eroding banks <input type="checkbox"/> lack of bedform diversity <input checked="" type="checkbox"/> excessive sediment deposition
3. Floodplain Morphology	3
<input type="checkbox"/> incised channel <input checked="" type="checkbox"/> floodplain fill/ levees	<input type="checkbox"/> entrenched channel <input type="checkbox"/> irregular/ obstructed floodplain
4. Vegetation	3
<input checked="" type="checkbox"/> narrow buffer width <input type="checkbox"/> poor overstory/tree cover	<input type="checkbox"/> invasive plants (banks/floodplain) <input type="checkbox"/> bare areas/mineral soil (banks/floodplain)
5. Habitat	3
<input type="checkbox"/> lack of woody debris <input checked="" type="checkbox"/> lack of diverse bedform/ flow	<input type="checkbox"/> poor water quality (turbid, algae, temperature) <input type="checkbox"/> lack of fine roots, leaf packs, coarse substrate
Score (of 20) and Rating (Poor 0-7; Fair 8-12; Good 13-17; Excellent 18-20)	14

Potential Solutions

- | | |
|--|--|
| <input checked="" type="checkbox"/> relocate/close trail | <input checked="" type="checkbox"/> trail crossing improvement |
| <input checked="" type="checkbox"/> vegetation planting | <input type="checkbox"/> mechanical grading |
| <input type="checkbox"/> in-stream structures | <input type="checkbox"/> watershed improvements |
| <input type="checkbox"/> preservation/ exclusion | <input type="checkbox"/> culvert rehabilitation/ replacement |
| <input type="checkbox"/> maintenance | <input type="checkbox"/> signs |

Comments

See also P07; Corn Mill Shoals Trail in buffer, providing sediment/ stormwater source.





Stream Condition – Site: S02

Map Grid Location: E9 Site visit date/ team): 4/13/15 / BK, JZ Drainage Area (Sq. Mi.): 18.3

Stream name & Location: Little River above Bridal Veil Falls

Streambed Substrate: Sand Length (ft): +/-1860 Bankfull Width (ft): +/- 35

Stream Condition and Function: Score from 0 to 4 indicating natural stream integrity and health (circle contributing factors): 0 = *very poor*; 1 = *poor*; 2 = *fair*; 3 = *good*; 4 = *excellent*

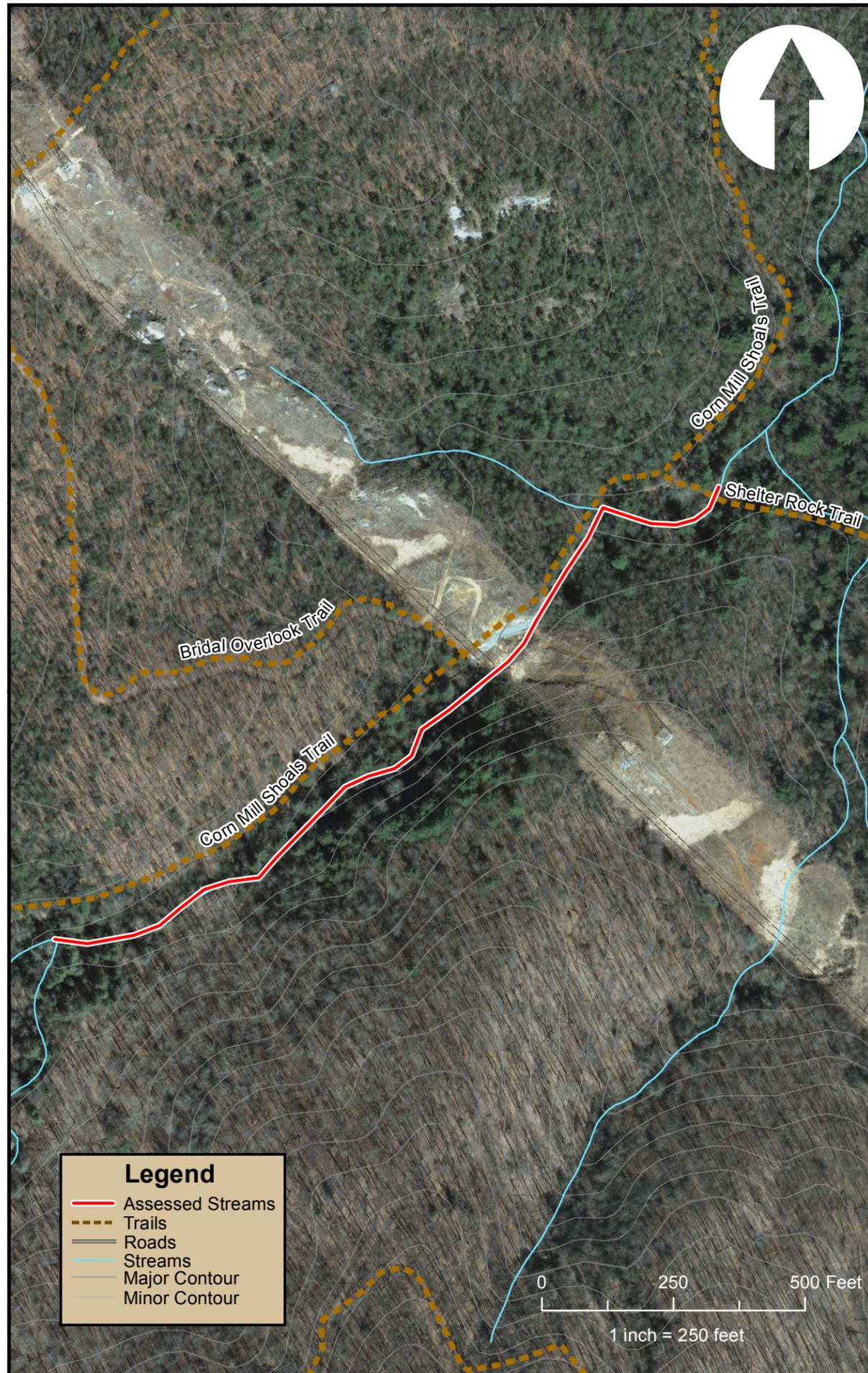
1. Site and Watershed Conditions	2
<input checked="" type="checkbox"/> stormwater input <input checked="" type="checkbox"/> trampled banks <input type="checkbox"/> trail crossing <input type="checkbox"/> bridge/culvert/armoring	<input checked="" type="checkbox"/> sediment input <input type="checkbox"/> equine/dog impacts <input checked="" type="checkbox"/> trail in buffer <input checked="" type="checkbox"/> utilities
2. Channel Morphology and Condition	2
<input type="checkbox"/> overwide <input type="checkbox"/> straightened <input type="checkbox"/> head-cutting <input type="checkbox"/> high bed scour	<input type="checkbox"/> incised <input checked="" type="checkbox"/> eroding banks <input checked="" type="checkbox"/> lack of bedform diversity <input checked="" type="checkbox"/> excessive sediment deposition
3. Floodplain Morphology	2
<input checked="" type="checkbox"/> incised channel <input type="checkbox"/> floodplain fill/ levees	<input checked="" type="checkbox"/> entrenched channel <input type="checkbox"/> irregular/ obstructed floodplain
4. Vegetation	3
<input checked="" type="checkbox"/> narrow buffer width <input type="checkbox"/> poor overstory/tree cover	<input type="checkbox"/> invasive plants (banks/floodplain) <input type="checkbox"/> bare areas/mineral soil (banks/floodplain)
5. Habitat	2
<input checked="" type="checkbox"/> lack of woody debris <input checked="" type="checkbox"/> lack of diverse bedform/ flow	<input type="checkbox"/> poor water quality (turbid, algae, temperature) <input type="checkbox"/> lack of fine roots, leaf packs, coarse substrate
Score (of 20) and Rating (Poor 0-7; Fair 8-12; Good 13-17; Excellent 18-20)	11

Potential Solutions

<input checked="" type="checkbox"/> relocate/close trail	<input type="checkbox"/> trail crossing improvement
<input checked="" type="checkbox"/> vegetation planting	<input checked="" type="checkbox"/> mechanical grading
<input type="checkbox"/> in-stream structures	<input type="checkbox"/> watershed improvements
<input checked="" type="checkbox"/> preservation/ exclusion	<input type="checkbox"/> culvert rehabilitation/ replacement
<input type="checkbox"/> maintenance	<input type="checkbox"/> signs

Comments
 Trail (both open and closed – though still used) in buffer. Trails provide sediment source and restrict buffer vegetation. Lengthy powerline crossing affects buffer.





Stream Condition – Site: S03

Map Grid Location: E10 Site visit date/ team): 8/31/15 / JZ Drainage Area (Sq. Mi.): < 0.1

Stream name & Location: Tributary along Corn Mill Shoals Trail

Streambed Substrate: sand, gravel Length (ft): +/-1665 Bankfull Width (ft): +/- 8

Stream Condition and Function: Score from 0 to 4 indicating natural stream integrity and health (circle contributing factors): 0 = very poor; 1 = poor; 2 = fair; 3 = good; 4 = excellent

1. Site and Watershed Conditions	2
<input checked="" type="checkbox"/> stormwater input <input type="checkbox"/> trampled banks <input type="checkbox"/> trail crossing <input checked="" type="checkbox"/> bridge/culvert/armoring	<input checked="" type="checkbox"/> sediment input <input type="checkbox"/> equine/dog impacts <input checked="" type="checkbox"/> trail in buffer <input checked="" type="checkbox"/> utilities
2. Channel Morphology and Condition	3
<input type="checkbox"/> overwide <input type="checkbox"/> straightened <input type="checkbox"/> head-cutting <input type="checkbox"/> high bed scour	<input type="checkbox"/> incised <input type="checkbox"/> eroding banks <input type="checkbox"/> lack of bedform diversity <input checked="" type="checkbox"/> excessive sediment deposition
3. Floodplain Morphology	3
<input type="checkbox"/> incised channel <input type="checkbox"/> floodplain fill/ levees	<input checked="" type="checkbox"/> entrenched channel <input type="checkbox"/> irregular/ obstructed floodplain
4. Vegetation	3
<input checked="" type="checkbox"/> narrow buffer width <input type="checkbox"/> poor overstory/tree cover	<input type="checkbox"/> invasive plants (banks/floodplain) <input checked="" type="checkbox"/> bare areas/mineral soil (banks/floodplain)
5. Habitat	3
<input type="checkbox"/> lack of woody debris <input type="checkbox"/> lack of diverse bedform/ flow	<input type="checkbox"/> poor water quality (turbid, algae, temperature) <input checked="" type="checkbox"/> lack of fine roots, leaf packs, coarse substrate
Score (of 20) and Rating (Poor 0-7; Fair 8-12; Good 13-17; Excellent 18-20)	14

Potential Solutions

- | | |
|--|--|
| <input checked="" type="checkbox"/> relocate/close trail | <input type="checkbox"/> trail crossing improvement |
| <input checked="" type="checkbox"/> vegetation planting | <input type="checkbox"/> mechanical grading |
| <input type="checkbox"/> in-stream structures | <input type="checkbox"/> watershed improvements |
| <input type="checkbox"/> preservation/ exclusion | <input type="checkbox"/> culvert rehabilitation/ replacement |
| <input type="checkbox"/> maintenance | <input type="checkbox"/> signs |

Comments

Trail in buffer with sediment/ stormwater runoff from trail directed to stream. Upland crosion from power line crossing is also sediment source.





Stream Condition – Site: S04

Map Grid Location: F9 Site visit date/ team): 8/31/15 / JZ Drainage Area (Sq. Mi.): 0.42

Stream name & Location: Tributary along Barn Trail

Streambed Substrate: sand, cobble Length (ft): +/- 380 Bankfull Width (ft): +/- 10

Stream Condition and Function: Score from 0 to 4 indicating natural stream integrity and health (circle contributing factors): 0 = very poor; 1 = poor; 2 = fair; 3 = good; 4 = excellent

1. Site and Watershed Conditions	2
<input type="checkbox"/> stormwater input <input type="checkbox"/> trampled banks <input type="checkbox"/> trail crossing <input type="checkbox"/> bridge/culvert/armoring	<input checked="" type="checkbox"/> sediment input <input type="checkbox"/> equine/dog impacts <input checked="" type="checkbox"/> trail in buffer <input type="checkbox"/> utilities
2. Channel Morphology and Condition	3
<input type="checkbox"/> overwide <input type="checkbox"/> straightened <input type="checkbox"/> head-cutting <input type="checkbox"/> high bed scour	<input type="checkbox"/> incised <input checked="" type="checkbox"/> eroding banks <input type="checkbox"/> lack of bedform diversity <input checked="" type="checkbox"/> excessive sediment deposition
3. Floodplain Morphology	3
<input type="checkbox"/> incised channel <input type="checkbox"/> floodplain fill/ levees	<input checked="" type="checkbox"/> entrenched channel <input type="checkbox"/> irregular/ obstructed floodplain
4. Vegetation	3
<input type="checkbox"/> narrow buffer width <input type="checkbox"/> poor overstory/tree cover	<input type="checkbox"/> invasive plants (banks/floodplain) <input checked="" type="checkbox"/> bare areas/mineral soil (banks/floodplain)
5. Habitat	3
<input type="checkbox"/> lack of woody debris <input type="checkbox"/> lack of diverse bedform/ flow	<input type="checkbox"/> poor water quality (turbid, algae, temperature) <input checked="" type="checkbox"/> lack of fine roots, leaf packs, coarse substrate
Score (of 20) and Rating (Poor 0-7; Fair 8-12; Good 13-17; Excellent 18-20)	14

Potential Solutions

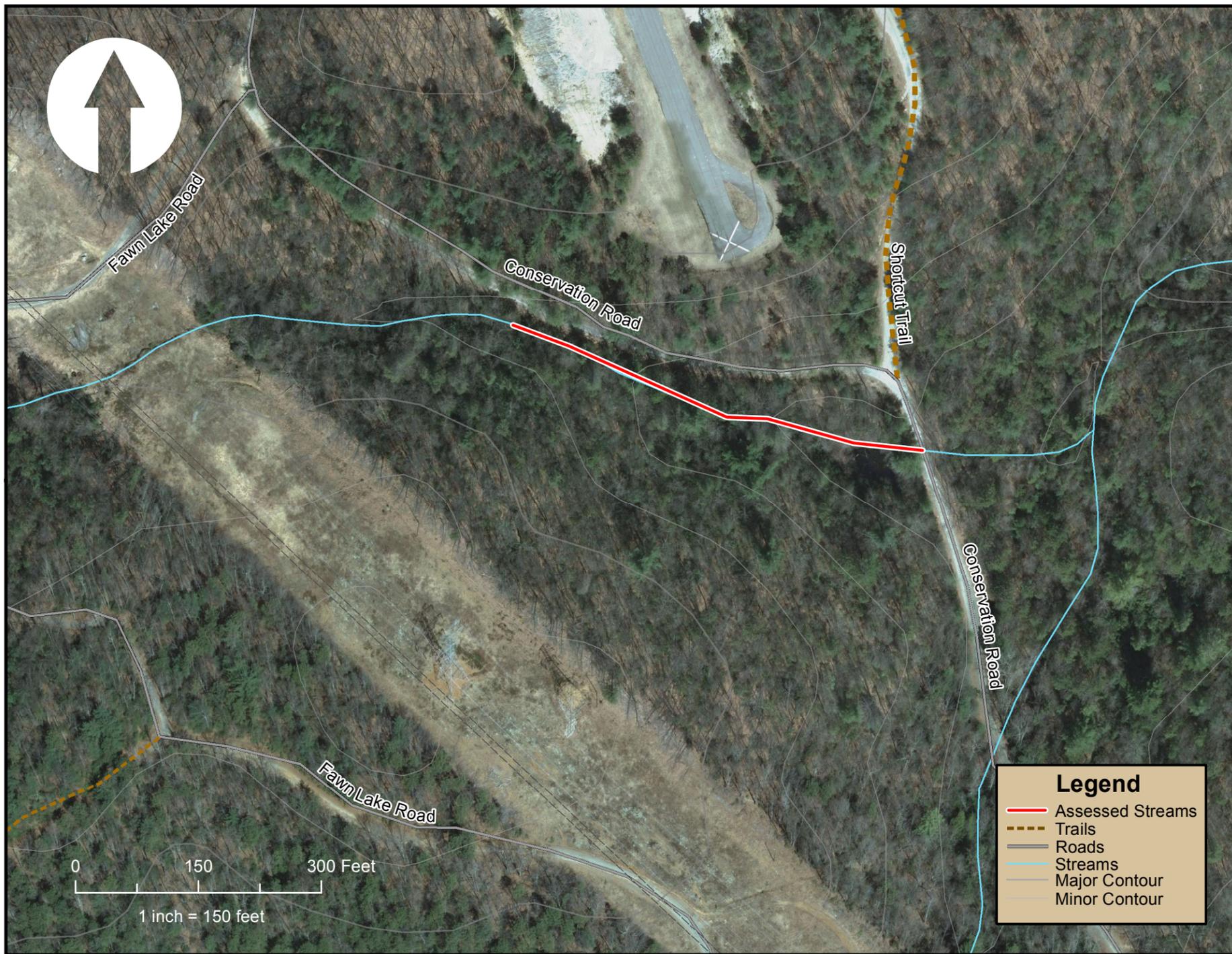
- | | |
|---|--|
| <input checked="" type="checkbox"/> relocate/close trail | <input type="checkbox"/> trail crossing improvement |
| <input checked="" type="checkbox"/> vegetation planting | <input type="checkbox"/> mechanical grading |
| <input type="checkbox"/> in-stream structures | <input type="checkbox"/> watershed improvements |
| <input checked="" type="checkbox"/> preservation/ exclusion | <input type="checkbox"/> culvert rehabilitation/ replacement |
| <input type="checkbox"/> maintenance | <input type="checkbox"/> signs |

Comments

Trail in buffer with sediment/ stormwater runoff from trail.

Legend

- Assessed Streams
- - - Trails
- Roads
- Streams
- Major Contour
- Minor Contour



Stream Condition – Site: S05

Map Grid Location: F10 Site visit date/ team): 8/17/15 / JZ Drainage Area (Sq. Mi.): 0.06

Stream name & Location: Tributary at Conservation Road

Streambed Substrate: silt Length (ft): +/- 515 Bankfull Width (ft): +/- 10

Stream Condition and Function: Score from 0 to 4 indicating natural stream integrity and health (circle contributing factors): *0 = very poor; 1 = poor; 2 = fair; 3 = good; 4 = excellent*

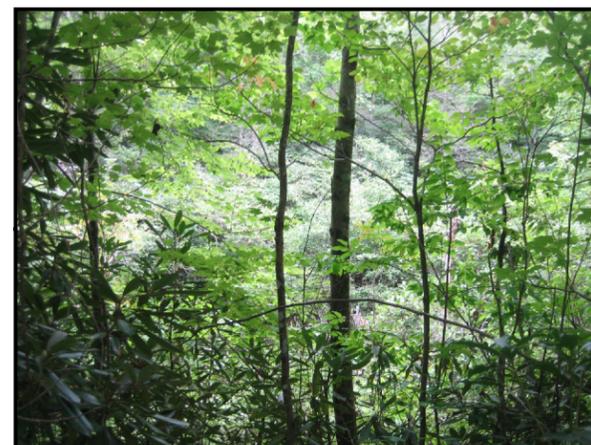
1. Site and Watershed Conditions	2
<input checked="" type="checkbox"/> stormwater input <input type="checkbox"/> trampled banks <input type="checkbox"/> trail crossing <input checked="" type="checkbox"/> bridge/culvert/armoring	<input checked="" type="checkbox"/> sediment input <input type="checkbox"/> equine/dog impacts <input type="checkbox"/> trail in buffer <input type="checkbox"/> utilities
2. Channel Morphology and Condition	1
<input checked="" type="checkbox"/> overwide <input type="checkbox"/> straightened <input type="checkbox"/> head-cutting <input type="checkbox"/> high bed scour	<input type="checkbox"/> incised <input type="checkbox"/> eroding banks <input checked="" type="checkbox"/> lack of bedform diversity <input type="checkbox"/> excessive sediment deposition
3. Floodplain Morphology	4
<input type="checkbox"/> incised channel <input type="checkbox"/> floodplain fill/ levees	<input type="checkbox"/> entrenched channel <input type="checkbox"/> irregular/ obstructed floodplain
4. Vegetation	3
<input type="checkbox"/> narrow buffer width <input checked="" type="checkbox"/> poor overstory/tree cover	<input type="checkbox"/> invasive plants (banks/floodplain) <input type="checkbox"/> bare areas/mineral soil (banks/floodplain)
5. Habitat	2
<input type="checkbox"/> lack of woody debris <input checked="" type="checkbox"/> lack of diverse bedform/ flow	<input type="checkbox"/> poor water quality (turbid, algae, temperature) <input checked="" type="checkbox"/> lack of fine roots, leaf packs, coarse substrate
Score (of 20) and Rating (Poor 0-7; Fair 8-12; Good 13-17; Excellent 18-20)	12

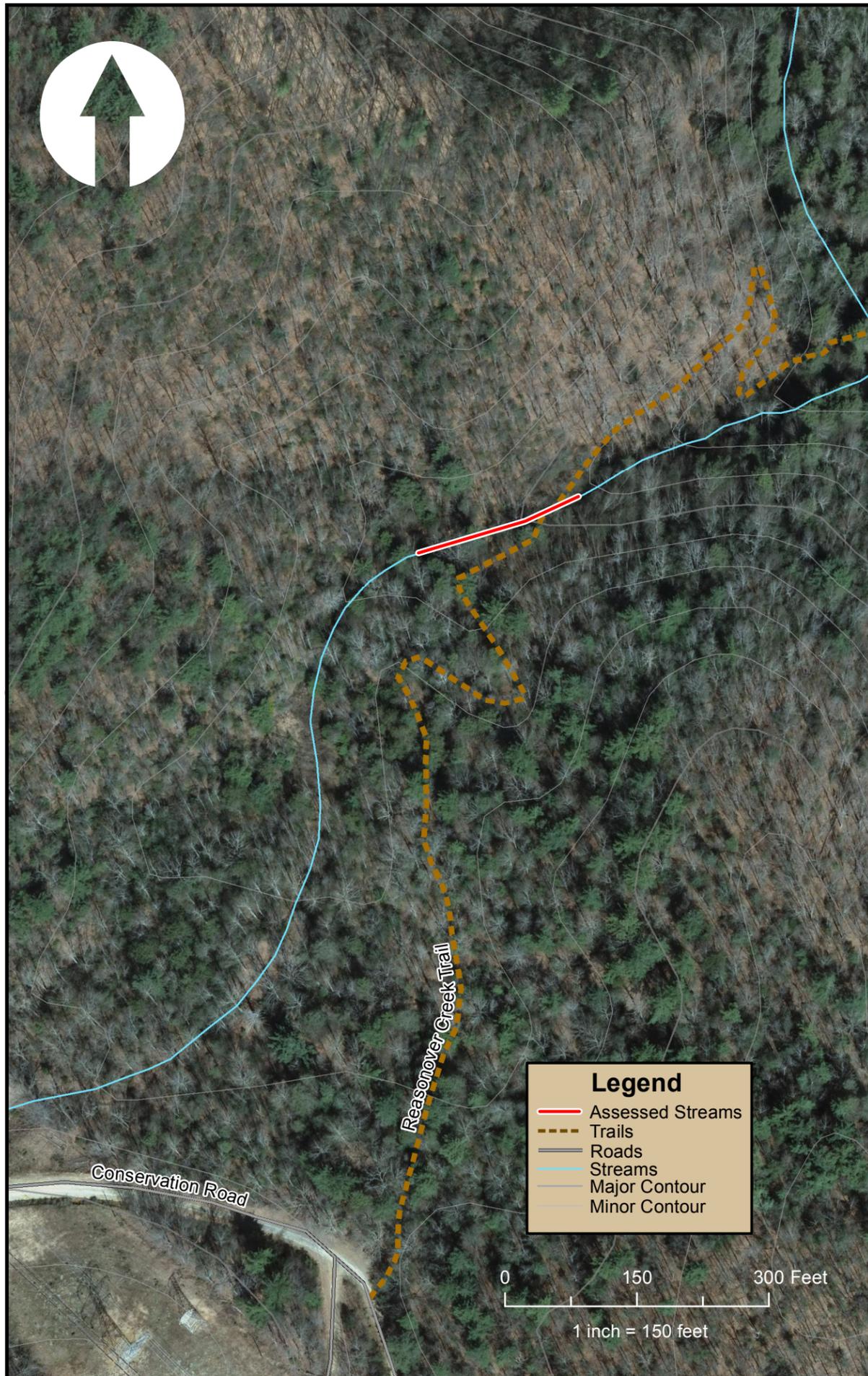
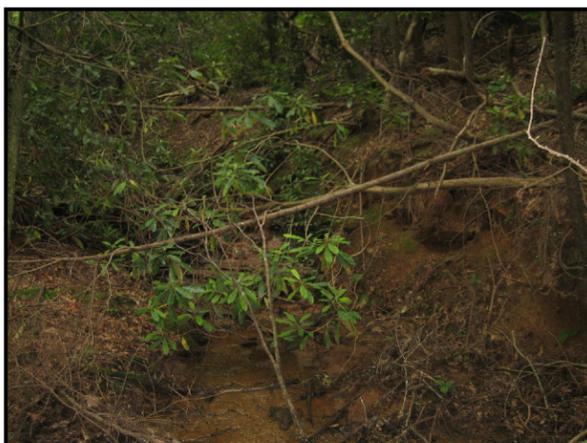
Potential Solutions

- | | |
|---|---|
| <input type="checkbox"/> relocate/close trail | <input type="checkbox"/> trail crossing improvement |
| <input checked="" type="checkbox"/> vegetation planting | <input type="checkbox"/> mechanical grading |
| <input type="checkbox"/> in-stream structures | <input type="checkbox"/> watershed improvements |
| <input type="checkbox"/> preservation/ exclusion | <input checked="" type="checkbox"/> culvert rehabilitation/ replacement |
| <input checked="" type="checkbox"/> maintenance | <input type="checkbox"/> signs |

Comments

Culvert clogged upstream of Conservation Road, creating large area of backwater in channel; woody vegetation has died as a result.





Stream Condition – Site: S06

Map Grid Location: G11 Site visit date/ team): 8/17/15 / JZ Drainage Area (Sq. Mi.): 0.06

Stream name & Location: Tributary to Reasonover Creek

Streambed Substrate: Clay, fine gravel, bedrock Length (ft): +/- 200 Bankfull Width (ft): +/- 10

Stream Condition and Function: Score from 0 to 4 indicating natural stream integrity and health (circle contributing factors): 0 = *very poor*; 1 = *poor*; 2 = *fair*; 3 = *good*; 4 = *excellent*

1. Site and Watershed Conditions	2
<input type="checkbox"/> stormwater input <input type="checkbox"/> trampled banks <input checked="" type="checkbox"/> trail crossing <input type="checkbox"/> bridge/culvert/armoring	<input checked="" type="checkbox"/> sediment input <input type="checkbox"/> equine/dog impacts <input checked="" type="checkbox"/> trail in buffer <input type="checkbox"/> utilities
2. Channel Morphology and Condition	2
<input type="checkbox"/> overwide <input type="checkbox"/> straightened <input type="checkbox"/> head-cutting <input type="checkbox"/> high bed scour	<input checked="" type="checkbox"/> incised <input checked="" type="checkbox"/> eroding banks <input checked="" type="checkbox"/> lack of bedform diversity <input checked="" type="checkbox"/> excessive sediment deposition
3. Floodplain Morphology	3
<input checked="" type="checkbox"/> incised channel <input type="checkbox"/> floodplain fill/ levees	<input checked="" type="checkbox"/> entrenched channel <input type="checkbox"/> irregular/ obstructed floodplain
4. Vegetation	3
<input type="checkbox"/> narrow buffer width <input type="checkbox"/> poor overstory/tree cover	<input type="checkbox"/> invasive plants (banks/floodplain) <input checked="" type="checkbox"/> bare areas/mineral soil (banks/floodplain)
5. Habitat	2
<input type="checkbox"/> lack of woody debris <input checked="" type="checkbox"/> lack of diverse bedform/ flow	<input type="checkbox"/> poor water quality (turbid, algae, temperature) <input checked="" type="checkbox"/> lack of fine roots, leaf packs, coarse substrate
Score (of 20) and Rating (Poor 0-7; Fair 8-12; Good 13-17; Excellent 18-20)	12

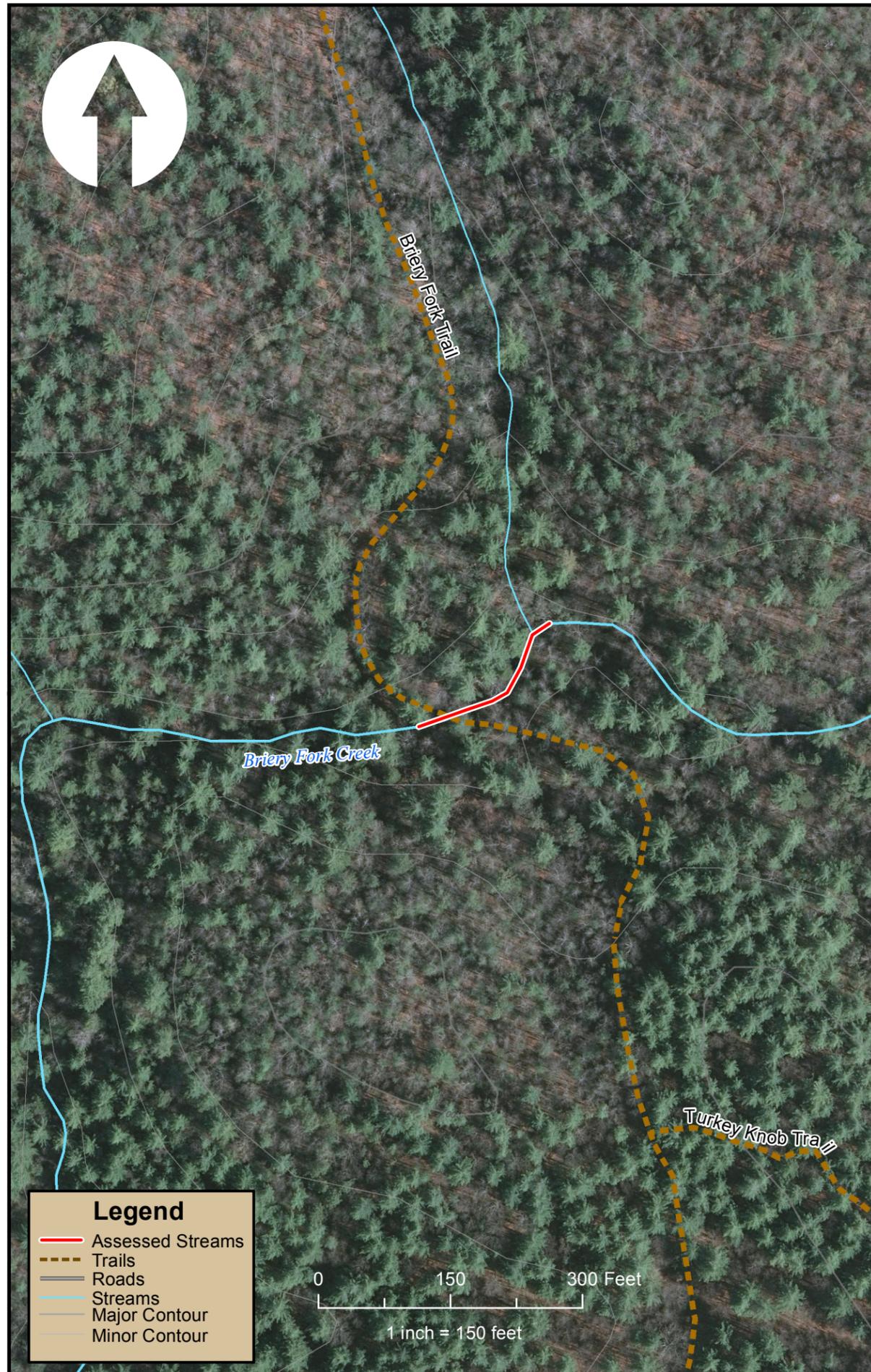
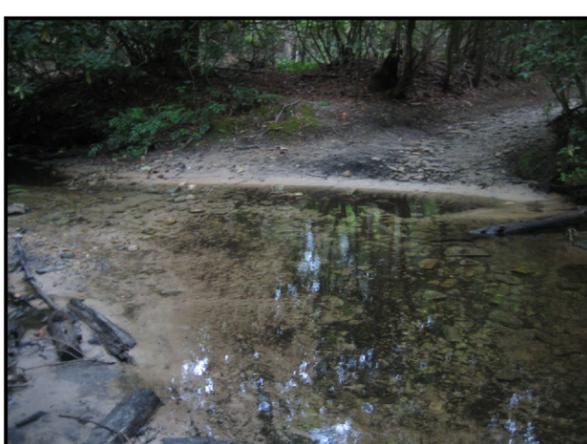
Potential Solutions

- | | |
|--|--|
| <input checked="" type="checkbox"/> relocate/close trail | <input type="checkbox"/> trail crossing improvement |
| <input checked="" type="checkbox"/> vegetation planting | <input type="checkbox"/> mechanical grading |
| <input checked="" type="checkbox"/> in-stream structures | <input type="checkbox"/> watershed improvements |
| <input type="checkbox"/> preservation/ exclusion | <input type="checkbox"/> culvert rehabilitation/ replacement |
| <input type="checkbox"/> maintenance | <input type="checkbox"/> signs |

Comments

Eroding left bank just downstream of bedrock grade control, fine sediment deposition in channel; trail near channel serves as sediment source.





Stream Condition – Site: S07

Map Grid Location: I 8 Site visit date/ team): 8/30/15 / JZ Drainage Area (Sq. Mi.): 1.14

Stream name & Location: Briery Fork Creek at Briery Fork Creek Trail

Streambed Substrate: Sand, gravel, cobble Length (ft): +/- 225 Bankfull Width (ft): +/- 15

Stream Condition and Function: Score from 0 to 4 indicating natural stream integrity and health (circle contributing factors): 0 = very poor; 1 = poor; 2 = fair; 3 = good; 4 = excellent

1. Site and Watershed Conditions	1
<input checked="" type="checkbox"/> stormwater input	<input checked="" type="checkbox"/> sediment input
<input checked="" type="checkbox"/> trampled banks	<input type="checkbox"/> equine/dog impacts
<input checked="" type="checkbox"/> trail crossing	<input checked="" type="checkbox"/> trail in buffer
<input type="checkbox"/> bridge/culvert/armoring	<input type="checkbox"/> utilities
2. Channel Morphology and Condition	2
<input checked="" type="checkbox"/> overwide	<input type="checkbox"/> incised
<input type="checkbox"/> straightened	<input checked="" type="checkbox"/> eroding banks
<input type="checkbox"/> head-cutting	<input checked="" type="checkbox"/> lack of bedform diversity
<input type="checkbox"/> high bed scour	<input checked="" type="checkbox"/> excessive sediment deposition
3. Floodplain Morphology	3
<input type="checkbox"/> incised channel	<input type="checkbox"/> entrenched channel
<input type="checkbox"/> floodplain fill/ levees	<input type="checkbox"/> irregular/ obstructed floodplain
4. Vegetation	2
<input checked="" type="checkbox"/> narrow buffer width	<input type="checkbox"/> invasive plants (banks/floodplain)
<input type="checkbox"/> poor overstory/tree cover	<input checked="" type="checkbox"/> bare areas/mineral soil (banks/floodplain)
5. Habitat	2
<input type="checkbox"/> lack of woody debris	<input checked="" type="checkbox"/> poor water quality (turbid, algae, temperature)
<input checked="" type="checkbox"/> lack of diverse bedform/ flow	<input checked="" type="checkbox"/> lack of fine roots, leaf packs, coarse substrate
Score (of 20) and Rating (Poor 0-7; Fair 8-12; Good 13-17; Excellent 18-20)	10

Potential Solutions

- | | |
|---|--|
| <input checked="" type="checkbox"/> relocate/close trail | <input checked="" type="checkbox"/> trail crossing improvement |
| <input checked="" type="checkbox"/> vegetation planting | <input type="checkbox"/> mechanical grading |
| <input checked="" type="checkbox"/> in-stream structures | <input type="checkbox"/> watershed improvements |
| <input checked="" type="checkbox"/> preservation/ exclusion | <input type="checkbox"/> culvert rehabilitation/ replacement |
| <input type="checkbox"/> maintenance | <input type="checkbox"/> signs |

Comments

Trail in buffer with unstable crossing (croding banks, overwide channel, sediment deposition).





Stream Condition – Site: S08

Map Grid Location: J8 Site visit date/ team): 8/30/15 / JZ Drainage Area (Sq. Mi.): < 0.1

Stream name & Location: Tributary at Briery Fork Creek

Streambed Substrate: Boulder Length (ft): +/- 300 Bankfull Width (ft): +/- 8

Stream Condition and Function: Score from 0 to 4 indicating natural stream integrity and health (circle contributing factors): 0 = *very poor*; 1 = *poor*; 2 = *fair*; 3 = *good*; 4 = *excellent*

1. Site and Watershed Conditions	2
<input type="checkbox"/> stormwater input <input type="checkbox"/> trampled banks <input type="checkbox"/> trail crossing <input type="checkbox"/> bridge/culvert/armoring	<input checked="" type="checkbox"/> sediment input <input type="checkbox"/> equine/dog impacts <input checked="" type="checkbox"/> trail in buffer <input type="checkbox"/> utilities
2. Channel Morphology and Condition	4
<input type="checkbox"/> overwide <input type="checkbox"/> straightened <input type="checkbox"/> head-cutting <input type="checkbox"/> high bed scour	<input type="checkbox"/> incised <input type="checkbox"/> eroding banks <input type="checkbox"/> lack of bedform diversity <input type="checkbox"/> excessive sediment deposition
3. Floodplain Morphology	3
<input type="checkbox"/> incised channel <input type="checkbox"/> floodplain fill/ levees	<input checked="" type="checkbox"/> entrenched channel <input type="checkbox"/> irregular/ obstructed floodplain
4. Vegetation	3
<input checked="" type="checkbox"/> narrow buffer width <input type="checkbox"/> poor overstory/tree cover	<input type="checkbox"/> invasive plants (banks/floodplain) <input checked="" type="checkbox"/> bare areas/mineral soil (banks/floodplain)
5. Habitat	4
<input type="checkbox"/> lack of woody debris <input type="checkbox"/> lack of diverse bedform/ flow	<input type="checkbox"/> poor water quality (turbid, algae, temperature) <input type="checkbox"/> lack of fine roots, leaf packs, coarse substrate
Score (of 20) and Rating (Poor 0-7; Fair 8-12; Good 13-17; Excellent 18-20)	16

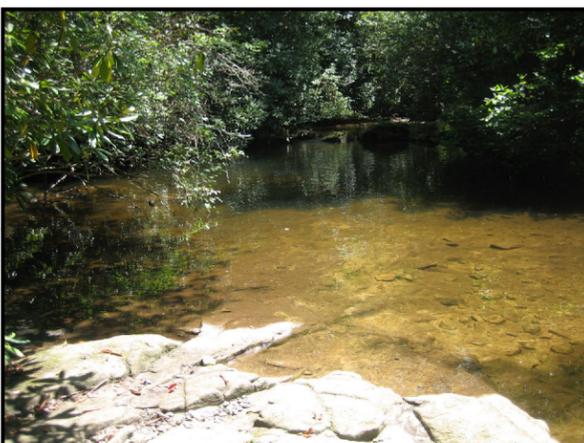
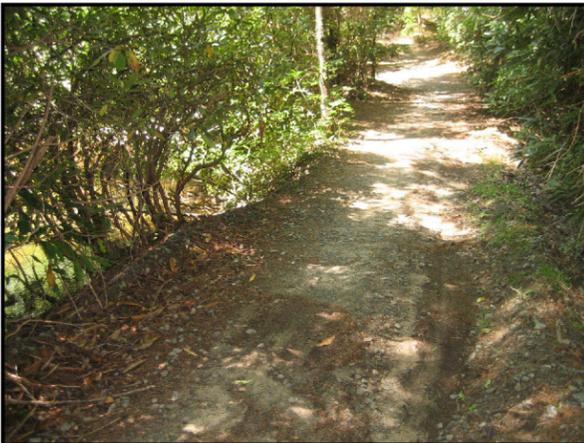
Potential Solutions

- | | |
|--|--|
| <input checked="" type="checkbox"/> relocate/close trail | <input type="checkbox"/> trail crossing improvement |
| <input checked="" type="checkbox"/> vegetation planting | <input type="checkbox"/> mechanical grading |
| <input type="checkbox"/> in-stream structures | <input type="checkbox"/> watershed improvements |
| <input type="checkbox"/> preservation/ exclusion | <input type="checkbox"/> culvert rehabilitation/ replacement |
| <input type="checkbox"/> maintenance | <input type="checkbox"/> signs |

Comments

Joanna Road within buffer of stream is serving as sediment source.





Stream Condition – Site: S09

Map Grid Location: H6 Site visit date/ team): 8/26/15 / JZ Drainage Area (Sq. Mi.): 4.11

Stream name & Location: Grassy Creek along Sandy Trail

Streambed Substrate: Silt, sand, cobble Length (ft): +/- 150 Bankfull Width (ft): +/- 25

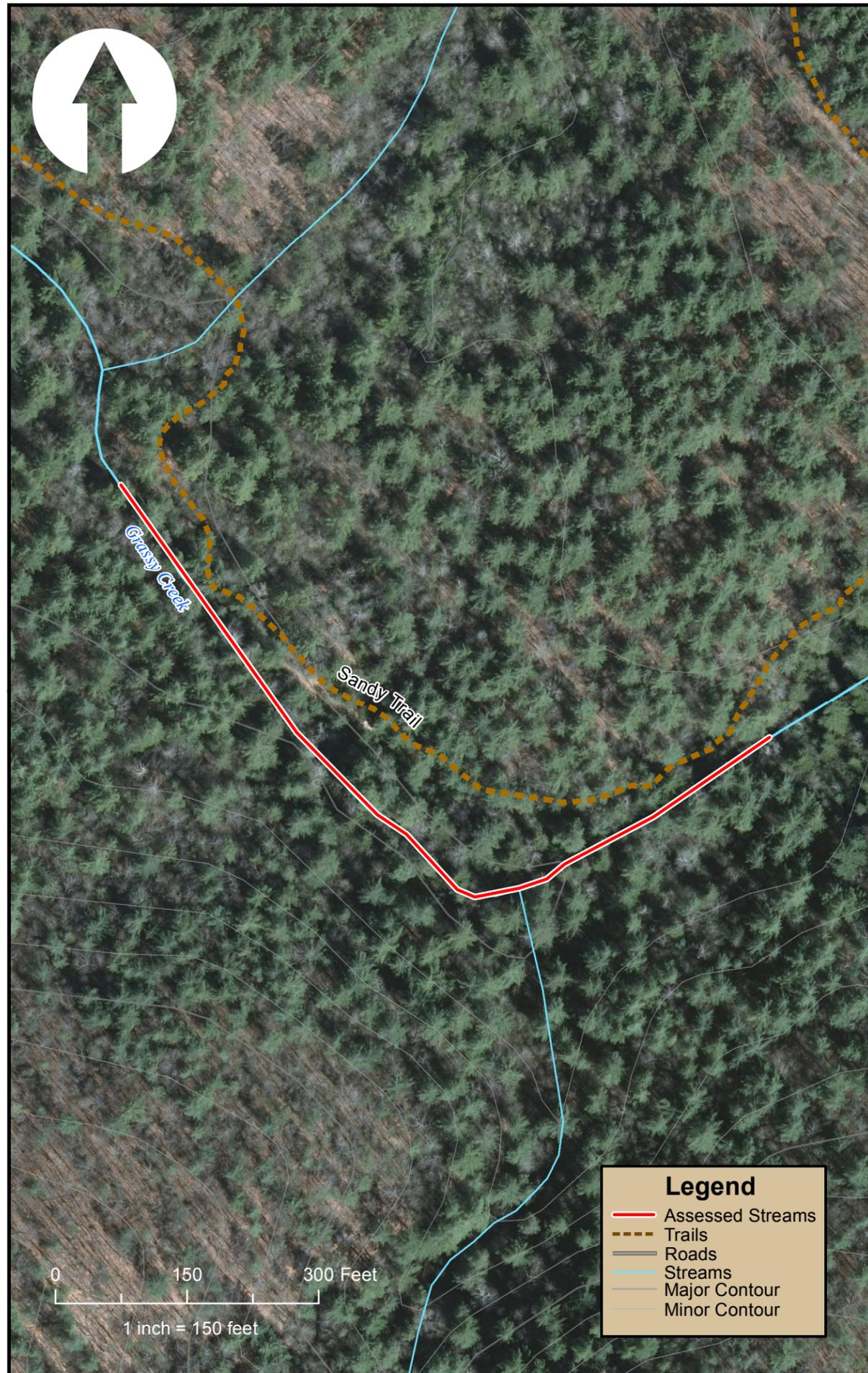
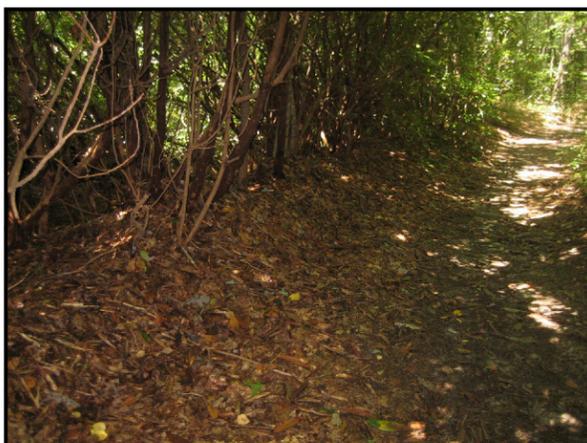
Stream Condition and Function: Score from 0 to 4 indicating natural stream integrity and health (circle contributing factors): 0 = *very poor*; 1 = *poor*; 2 = *fair*; 3 = *good*; 4 = *excellent*

1. Site and Watershed Conditions	2
<input type="checkbox"/> stormwater input	<input checked="" type="checkbox"/> sediment input
<input type="checkbox"/> trampled banks	<input type="checkbox"/> equine/dog impacts
<input type="checkbox"/> trail crossing	<input checked="" type="checkbox"/> trail in buffer
<input type="checkbox"/> bridge/culvert/armoring	<input type="checkbox"/> utilities
2. Channel Morphology and Condition	2
<input checked="" type="checkbox"/> overwide	<input type="checkbox"/> incised
<input type="checkbox"/> straightened	<input checked="" type="checkbox"/> eroding banks
<input type="checkbox"/> head-cutting	<input checked="" type="checkbox"/> lack of bedform diversity
<input type="checkbox"/> high bed scour	<input checked="" type="checkbox"/> excessive sediment deposition
3. Floodplain Morphology	3
<input type="checkbox"/> incised channel	<input checked="" type="checkbox"/> entrenched channel
<input type="checkbox"/> floodplain fill/ levees	<input type="checkbox"/> irregular/ obstructed floodplain
4. Vegetation	2
<input checked="" type="checkbox"/> narrow buffer width	<input type="checkbox"/> invasive plants (banks/floodplain)
<input checked="" type="checkbox"/> poor overstory/tree cover	<input checked="" type="checkbox"/> bare areas/mineral soil (banks/floodplain)
5. Habitat	2
<input checked="" type="checkbox"/> lack of woody debris	<input type="checkbox"/> poor water quality (turbid, algae, temperature)
<input checked="" type="checkbox"/> lack of diverse bedform/ flow	<input type="checkbox"/> lack of fine roots, leaf packs, coarse substrate
Score (of 20) and Rating (Poor 0-7; Fair 8-12; Good 13-17; Excellent 18-20)	11

Potential Solutions	<input type="checkbox"/> trail crossing improvement
<input checked="" type="checkbox"/> relocate/close trail	<input type="checkbox"/> mechanical grading
<input checked="" type="checkbox"/> vegetation planting	<input type="checkbox"/> watershed improvements
<input checked="" type="checkbox"/> in-stream structures	<input type="checkbox"/> culvert rehabilitation/ replacement
<input type="checkbox"/> preservation/ exclusion	<input type="checkbox"/> signs
<input type="checkbox"/> maintenance	

Comments
Trail crossing stable. However, trail in buffer with minor stream bank erosion.





Stream Condition – Site: S10

Map Grid Location: H6 Site visit date/ team): 8/26/15 / JZ Drainage Area (Sq. Mi.): 4.35

Stream name & Location: Grassy Creek along Sandy Trail

Streambed Substrate: sand, cobble Length (ft): +/-1015 Bankfull Width (ft): +/- 25

Stream Condition and Function: Score from 0 to 4 indicating natural stream integrity and health (circle contributing factors): 0 = very poor; 1 = poor; 2 = fair; 3 = good; 4 = excellent

1. Site and Watershed Conditions	3
<input type="checkbox"/> stormwater input <input type="checkbox"/> trampled banks <input type="checkbox"/> trail crossing <input type="checkbox"/> bridge/culvert/armoring	<input type="checkbox"/> sediment input <input type="checkbox"/> equine/dog impacts <input checked="" type="checkbox"/> trail in buffer <input type="checkbox"/> utilities
2. Channel Morphology and Condition	3
<input type="checkbox"/> overwide <input type="checkbox"/> straightened <input type="checkbox"/> head-cutting <input type="checkbox"/> high bed scour	<input type="checkbox"/> incised <input checked="" type="checkbox"/> eroding banks <input type="checkbox"/> lack of bedform diversity <input checked="" type="checkbox"/> excessive sediment deposition
3. Floodplain Morphology	2
<input checked="" type="checkbox"/> incised channel <input checked="" type="checkbox"/> floodplain fill/ levees	<input type="checkbox"/> entrenched channel <input type="checkbox"/> irregular/ obstructed floodplain
4. Vegetation	2
<input checked="" type="checkbox"/> narrow buffer width <input type="checkbox"/> poor overstory/tree cover	<input type="checkbox"/> invasive plants (banks/floodplain) <input checked="" type="checkbox"/> bare areas/mineral soil (banks/floodplain)
5. Habitat	3
<input checked="" type="checkbox"/> lack of woody debris <input type="checkbox"/> lack of diverse bedform/ flow	<input checked="" type="checkbox"/> poor water quality (turbid, algae, temperature) <input type="checkbox"/> lack of fine roots, leaf packs, coarse substrate
Score (of 20) and Rating (Poor 0-7; Fair 8-12; Good 13-17; Excellent 18-20)	13

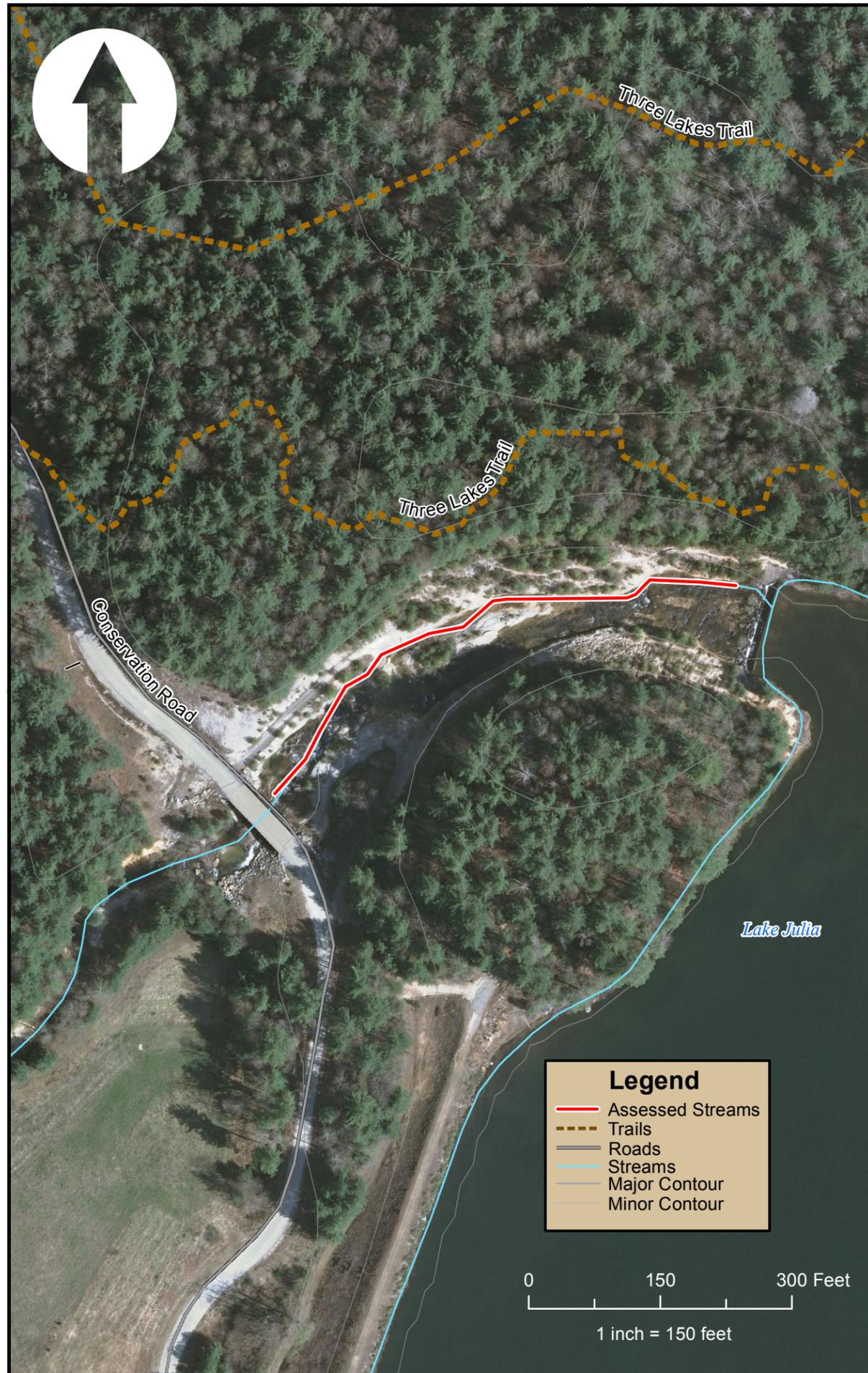
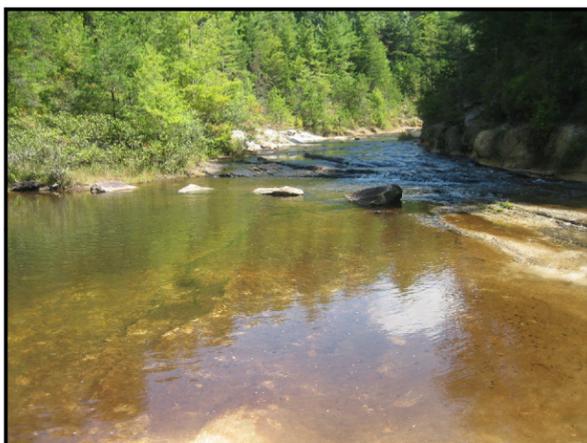
Potential Solutions

- | | |
|--|--|
| <input checked="" type="checkbox"/> relocate/close trail | <input type="checkbox"/> trail crossing improvement |
| <input checked="" type="checkbox"/> vegetation planting | <input type="checkbox"/> mechanical grading |
| <input checked="" type="checkbox"/> in-stream structures | <input type="checkbox"/> watershed improvements |
| <input type="checkbox"/> preservation/ exclusion | <input type="checkbox"/> culvert rehabilitation/ replacement |
| <input type="checkbox"/> maintenance | <input type="checkbox"/> signs |

Comments

Stream generally stable, though trail and levee in buffer are detrimental.





Stream Condition – Site: S11

Map Grid Location: F8 Site visit date/ team): 8/31/15 / JZ Drainage Area (Sq. Mi.): 6.70

Stream name & Location: Reasonover Creek below Lake Julia

Streambed Substrate: bedrock Length (ft): +/- 630 Bankfull Width (ft): +/- 50

Stream Condition and Function: Score from 0 to 4 indicating natural stream integrity and health (circle contributing factors): 0 = *very poor*; 1 = *poor*; 2 = *fair*; 3 = *good*; 4 = *excellent*

1. Site and Watershed Conditions	1
<input type="checkbox"/> stormwater input	<input checked="" type="checkbox"/> sediment input
<input checked="" type="checkbox"/> trampled banks	<input checked="" type="checkbox"/> equine/dog impacts
<input type="checkbox"/> trail crossing	<input checked="" type="checkbox"/> trail in buffer
<input checked="" type="checkbox"/> bridge/culvert/armoring	<input type="checkbox"/> utilities
2. Channel Morphology and Condition	1
<input checked="" type="checkbox"/> overwide	<input type="checkbox"/> incised
<input type="checkbox"/> straightened	<input checked="" type="checkbox"/> eroding banks
<input type="checkbox"/> head-cutting	<input checked="" type="checkbox"/> lack of bedform diversity
<input type="checkbox"/> high bed scour	<input type="checkbox"/> excessive sediment deposition
3. Floodplain Morphology	2
<input type="checkbox"/> incised channel	<input checked="" type="checkbox"/> entrenched channel
<input type="checkbox"/> floodplain fill/ levees	<input type="checkbox"/> irregular/ obstructed floodplain
4. Vegetation	1
<input type="checkbox"/> narrow buffer width	<input type="checkbox"/> invasive plants (banks/floodplain)
<input checked="" type="checkbox"/> poor overstory/tree cover	<input checked="" type="checkbox"/> bare areas/mineral soil (banks/floodplain)
5. Habitat	0
<input checked="" type="checkbox"/> lack of woody debris	<input checked="" type="checkbox"/> poor water quality (turbid, algae, temperature)
<input checked="" type="checkbox"/> lack of diverse bedform/ flow	<input checked="" type="checkbox"/> lack of fine roots, leaf packs, coarse substrate
Score (of 20) and Rating (Poor 0-7; Fair 8-12; Good 13-17; Excellent 18-20)	5

Potential Solutions

- | | |
|--|--|
| <input type="checkbox"/> relocate/close trail | <input type="checkbox"/> trail crossing improvement |
| <input checked="" type="checkbox"/> vegetation planting | <input checked="" type="checkbox"/> mechanical grading |
| <input checked="" type="checkbox"/> in-stream structures | <input type="checkbox"/> watershed improvements |
| <input type="checkbox"/> preservation/ exclusion | <input type="checkbox"/> culvert rehabilitation/ replacement |
| <input type="checkbox"/> maintenance | <input type="checkbox"/> signs |

Comments

Stream over widened on bedrock with steep, unvegetated banks. Restoration challenging due to bedrock bed and lack of soil. Consider retrofit to Lake Julia outlet to lower water temperature.





Legend

- Assessed Streams
- - - Trails
- Roads
- Streams
- Major Contour
- Minor Contour

Stream Condition – Site: S12

Map Grid Location: F6 Site visit date/ team): 8/19/15 / JZ Drainage Area (Sq. Mi.): 33.2

Stream name & Location: Little River between High Falls and Triple Falls

Streambed Substrate: Cobble/ boulder, silt Length (ft): +/- 2750 Bankfull Width (ft): +/- 45

Stream Condition and Function: Score from 0 to 4 indicating natural stream integrity and health (circle contributing factors): *0 = very poor; 1 = poor; 2 = fair; 3 = good; 4 = excellent*

1. Site and Watershed Conditions	3
<input checked="" type="checkbox"/> stormwater input <input type="checkbox"/> trampled banks <input type="checkbox"/> trail crossing <input type="checkbox"/> bridge/culvert/armoring	<input checked="" type="checkbox"/> sediment input <input type="checkbox"/> equine/dog impacts <input checked="" type="checkbox"/> trail in buffer <input type="checkbox"/> utilities
2. Channel Morphology and Condition	3
<input type="checkbox"/> overwide <input type="checkbox"/> straightened <input type="checkbox"/> head-cutting <input type="checkbox"/> high bed scour	<input type="checkbox"/> incised <input checked="" type="checkbox"/> eroding banks <input type="checkbox"/> lack of bedform diversity <input checked="" type="checkbox"/> excessive sediment deposition
3. Floodplain Morphology	2
<input checked="" type="checkbox"/> incised channel <input type="checkbox"/> floodplain fill/ levees	<input checked="" type="checkbox"/> entrenched channel <input type="checkbox"/> irregular/ obstructed floodplain
4. Vegetation	2
<input checked="" type="checkbox"/> narrow buffer width <input checked="" type="checkbox"/> poor overstory/tree cover	<input type="checkbox"/> invasive plants (banks/floodplain) <input checked="" type="checkbox"/> bare areas/mineral soil (banks/floodplain)
5. Habitat	2
<input type="checkbox"/> lack of woody debris <input checked="" type="checkbox"/> lack of diverse bedform/ flow	<input type="checkbox"/> poor water quality (turbid, algae, temperature) <input checked="" type="checkbox"/> lack of fine roots, leaf packs, coarse substrate
Score (of 20) and Rating (Poor 0-7; Fair 8-12; Good 13-17; Excellent 18-20)	12

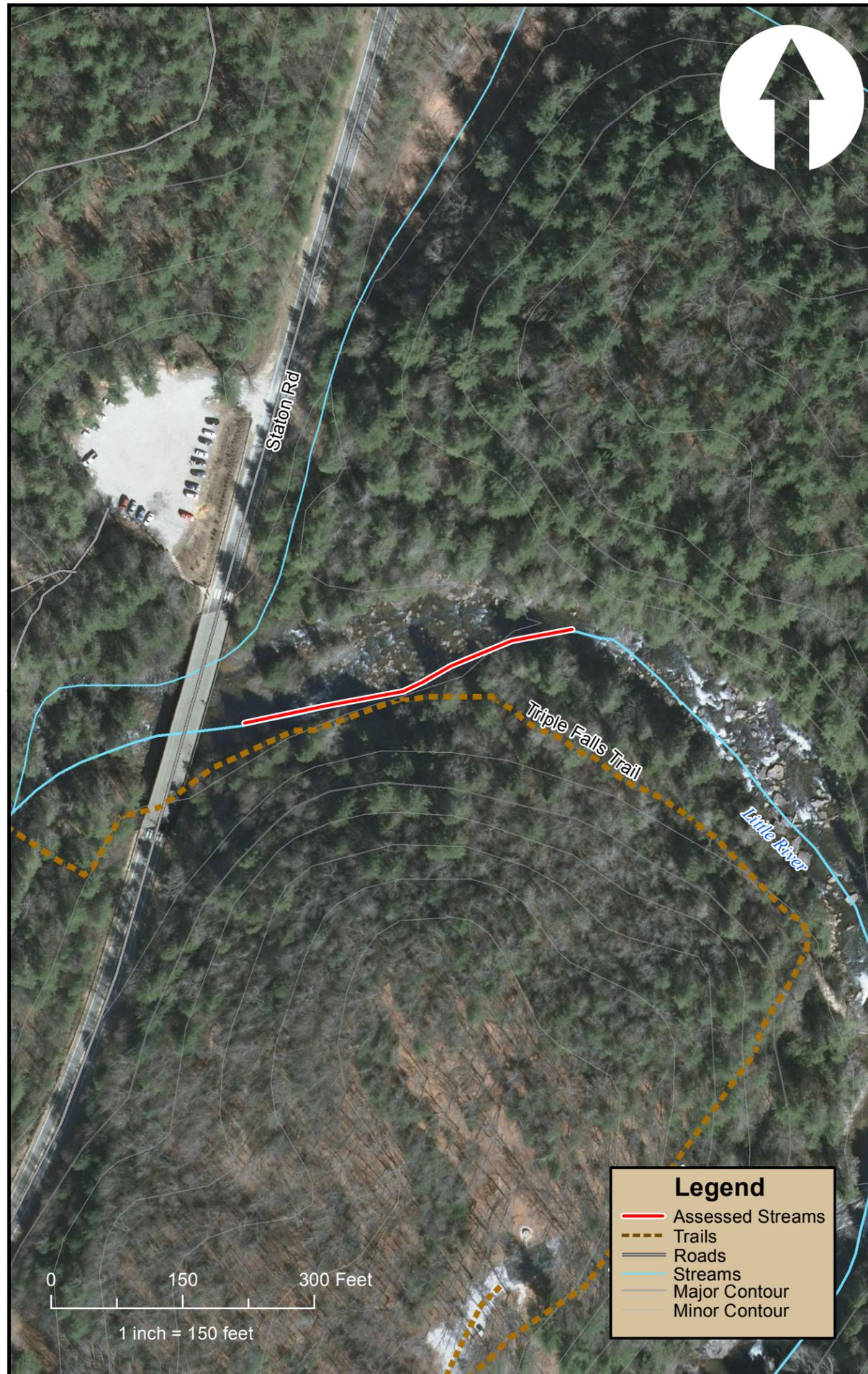
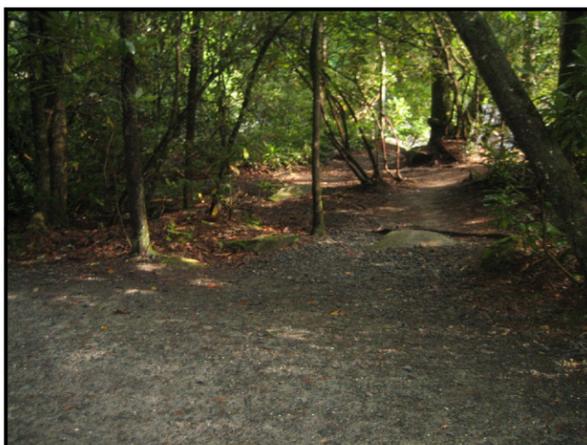
Potential Solutions

- | | |
|---|--|
| <input checked="" type="checkbox"/> relocate/close trail | <input type="checkbox"/> trail crossing improvement |
| <input checked="" type="checkbox"/> vegetation planting | <input type="checkbox"/> mechanical grading |
| <input checked="" type="checkbox"/> in-stream structures | <input type="checkbox"/> watershed improvements |
| <input checked="" type="checkbox"/> preservation/ exclusion | <input type="checkbox"/> culvert rehabilitation/ replacement |
| <input checked="" type="checkbox"/> maintenance | <input type="checkbox"/> signs |

Comments

Trail along river leads to sediment and stormwater input. Some croding banks and fine scdiment in river. BMPs exist on road, but require maintenance.





Stream Condition – Site: S13

Map Grid Location: **E-F 5** Site visit date/ team): 8/19/15 / JZ Drainage Area (Sq. Mi.): 33.3

Stream name & Location: Little River upstream Staton Road

Streambed Substrate: Boulder, bedrock Length (ft): +/- 390 Bankfull Width (ft): +/- 45

Stream Condition and Function: Score from 0 to 4 indicating natural stream integrity and health (circle contributing factors): 0 = very poor; 1 = poor; 2 = fair; 3 = good; 4 = excellent

1. Site and Watershed Conditions	2
<input checked="" type="checkbox"/> stormwater input <input checked="" type="checkbox"/> trampled banks <input type="checkbox"/> trail crossing <input type="checkbox"/> bridge/culvert/armoring	<input checked="" type="checkbox"/> sediment input <input type="checkbox"/> equine/dog impacts <input checked="" type="checkbox"/> trail in buffer <input type="checkbox"/> utilities
2. Channel Morphology and Condition	2
<input type="checkbox"/> overwide <input type="checkbox"/> straightened <input type="checkbox"/> head-cutting <input type="checkbox"/> high bed scour	<input type="checkbox"/> incised <input checked="" type="checkbox"/> eroding banks <input type="checkbox"/> lack of bedform diversity <input checked="" type="checkbox"/> excessive sediment deposition
3. Floodplain Morphology	3
<input type="checkbox"/> incised channel <input type="checkbox"/> floodplain fill/ levees	<input checked="" type="checkbox"/> entrenched channel <input type="checkbox"/> irregular/ obstructed floodplain
4. Vegetation	2
<input checked="" type="checkbox"/> narrow buffer width <input checked="" type="checkbox"/> poor overstory/tree cover	<input type="checkbox"/> invasive plants (banks/floodplain) <input checked="" type="checkbox"/> bare areas/mineral soil (banks/floodplain)
5. Habitat	2
<input checked="" type="checkbox"/> lack of woody debris <input type="checkbox"/> lack of diverse bedform/ flow	<input type="checkbox"/> poor water quality (turbid, algae, temperature) <input checked="" type="checkbox"/> lack of fine roots, leaf packs, coarse substrate
Score (of 20) and Rating (Poor 0-7; Fair 8-12; Good 13-17; Excellent 18-20)	11

Potential Solutions

- | | |
|---|--|
| <input checked="" type="checkbox"/> relocate/close trail | <input type="checkbox"/> trail crossing improvement |
| <input checked="" type="checkbox"/> vegetation planting | <input type="checkbox"/> mechanical grading |
| <input type="checkbox"/> in-stream structures | <input type="checkbox"/> watershed improvements |
| <input checked="" type="checkbox"/> preservation/ exclusion | <input type="checkbox"/> culvert rehabilitation/ replacement |
| <input type="checkbox"/> maintenance | <input checked="" type="checkbox"/> signs |

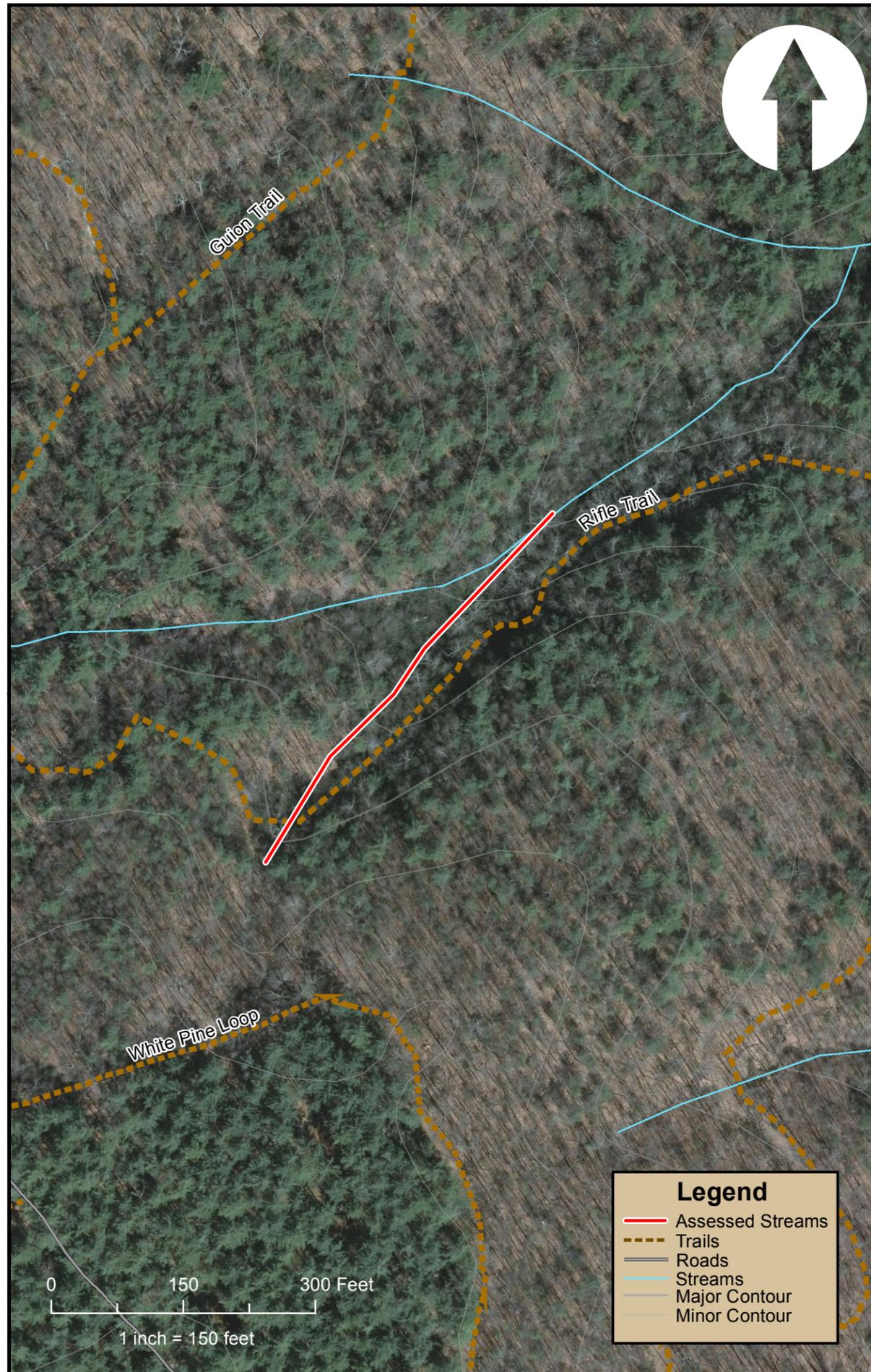
Comments

Wide trail in buffer serves as sediment source and lacks vegetation. Several informal trails to the water contribute to buffer impacts.

Legend

- Assessed Streams
- - - Trails
- Roads
- Streams
- Major Contour
- Minor Contour





Stream Condition – Site: S14

Map Grid Location: H2 Site visit date/ team): 8/26/15 / JZ Drainage Area (Sq. Mi.): < 0.1

Stream name & Location: Tributary along Rifle Trail

Streambed Substrate: Sand Length (ft): +/- 515 Bankfull Width (ft): +/- 5

Stream Condition and Function: Score from 0 to 4 indicating natural stream integrity and health (circle contributing factors): 0 = *very poor*; 1 = *poor*; 2 = *fair*; 3 = *good*; 4 = *excellent*

1. Site and Watershed Conditions	1
<input checked="" type="checkbox"/> stormwater input <input type="checkbox"/> trampled banks <input checked="" type="checkbox"/> trail crossing <input type="checkbox"/> bridge/culvert/armoring	<input checked="" type="checkbox"/> sediment input <input type="checkbox"/> equine/dog impacts <input checked="" type="checkbox"/> trail in buffer <input type="checkbox"/> utilities
2. Channel Morphology and Condition	2
<input type="checkbox"/> overwide <input type="checkbox"/> straightened <input type="checkbox"/> head-cutting <input type="checkbox"/> high bed scour	<input type="checkbox"/> incised <input type="checkbox"/> eroding banks <input checked="" type="checkbox"/> lack of bedform diversity <input checked="" type="checkbox"/> excessive sediment deposition
3. Floodplain Morphology	1
<input checked="" type="checkbox"/> incised channel <input checked="" type="checkbox"/> floodplain fill/ levees	<input checked="" type="checkbox"/> entrenched channel <input type="checkbox"/> irregular/ obstructed floodplain
4. Vegetation	2
<input checked="" type="checkbox"/> narrow buffer width <input type="checkbox"/> poor overstory/tree cover	<input type="checkbox"/> invasive plants (banks/floodplain) <input checked="" type="checkbox"/> bare areas/mineral soil (banks/floodplain)
5. Habitat	2
<input type="checkbox"/> lack of woody debris <input checked="" type="checkbox"/> lack of diverse bedform/ flow	<input type="checkbox"/> poor water quality (turbid, algae, temperature) <input checked="" type="checkbox"/> lack of fine roots, leaf packs, coarse substrate
Score (of 20) and Rating (Poor 0-7; Fair 8-12; Good 13-17; Excellent 18-20)	8

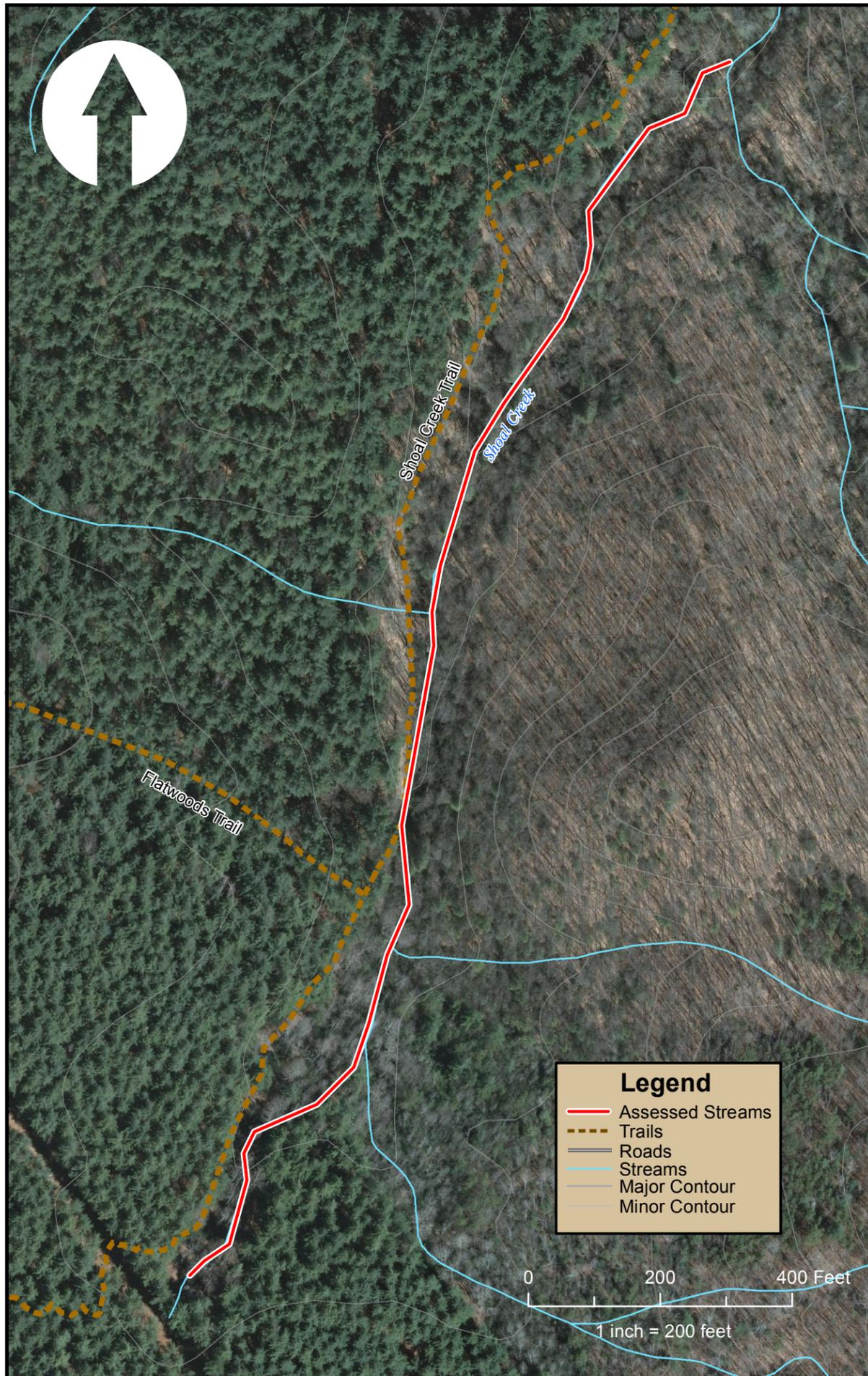
Potential Solutions

- | | |
|---|--|
| <input checked="" type="checkbox"/> relocate/close trail | <input type="checkbox"/> trail crossing improvement |
| <input checked="" type="checkbox"/> vegetation planting | <input type="checkbox"/> mechanical grading |
| <input type="checkbox"/> in-stream structures | <input type="checkbox"/> watershed improvements |
| <input checked="" type="checkbox"/> preservation/ exclusion | <input type="checkbox"/> culvert rehabilitation/ replacement |
| <input type="checkbox"/> maintenance | <input checked="" type="checkbox"/> signs |

Comments

Trail in buffer provides multiple sources of fine sediment, which is frequently evident in stream bed.





Stream Condition – Site: S15

Map Grid Location: H3 Site visit date/ team): 8/26/15 / JZ Drainage Area (Sq. Mi.): 0.14

Stream name & Location: Shoal Creek

Streambed Substrate: Sand Length (ft): +/- 2135 Bankfull Width (ft): +/- 5

Stream Condition and Function: Score from 0 to 4 indicating natural stream integrity and health (circle contributing factors): 0 = very poor; 1 = poor; 2 = fair; 3 = good; 4 = excellent

1. Site and Watershed Conditions	1
<input type="checkbox"/> stormwater input <input type="checkbox"/> trampled banks <input type="checkbox"/> trail crossing <input type="checkbox"/> bridge/culvert/armoring	<input type="checkbox"/> sediment input <input type="checkbox"/> equine/dog impacts <input checked="" type="checkbox"/> trail in buffer <input checked="" type="checkbox"/> utilities
2. Channel Morphology and Condition	1
<input type="checkbox"/> overwide <input type="checkbox"/> straightened <input checked="" type="checkbox"/> head-cutting <input type="checkbox"/> high bed scour	<input type="checkbox"/> incised <input checked="" type="checkbox"/> eroding banks <input type="checkbox"/> lack of bedform diversity <input checked="" type="checkbox"/> excessive sediment deposition
3. Floodplain Morphology	1
<input checked="" type="checkbox"/> incised channel <input checked="" type="checkbox"/> floodplain fill/ levees	<input checked="" type="checkbox"/> entrenched channel <input type="checkbox"/> irregular/ obstructed floodplain
4. Vegetation	2
<input checked="" type="checkbox"/> narrow buffer width <input checked="" type="checkbox"/> poor overstory/tree cover	<input type="checkbox"/> invasive plants (banks/floodplain) <input checked="" type="checkbox"/> bare areas/mineral soil (banks/floodplain)
5. Habitat	2
<input type="checkbox"/> lack of woody debris <input checked="" type="checkbox"/> lack of diverse bedform/ flow	<input type="checkbox"/> poor water quality (turbid, algae, temperature) <input checked="" type="checkbox"/> lack of fine roots, leaf packs, coarse substrate
Score (of 20) and Rating (Poor 0-7; Fair 8-12; Good 13-17; Excellent 18-20)	7

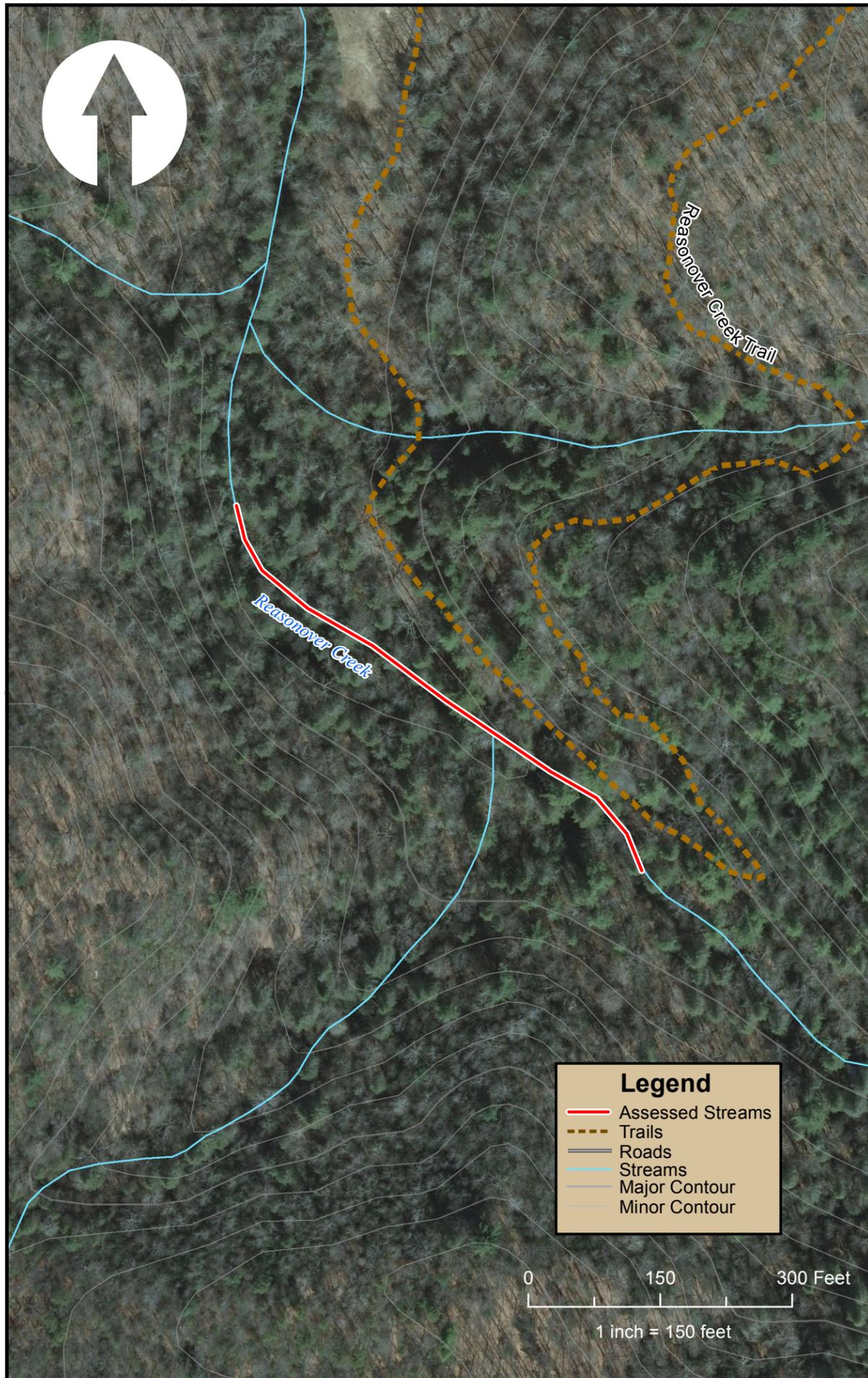
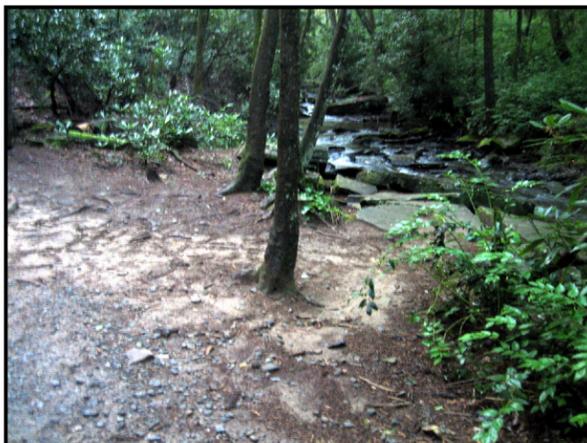
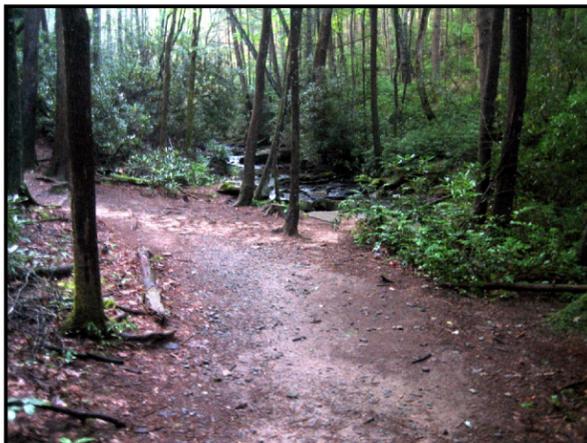
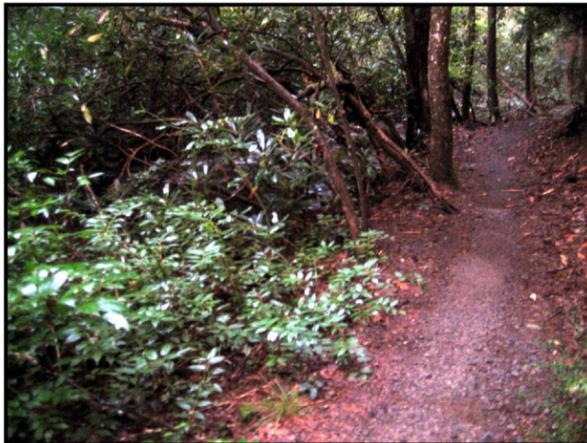
Potential Solutions

- | | |
|---|--|
| <input checked="" type="checkbox"/> relocate/close trail | <input type="checkbox"/> trail crossing improvement |
| <input checked="" type="checkbox"/> vegetation planting | <input type="checkbox"/> mechanical grading |
| <input checked="" type="checkbox"/> in-stream structures | <input type="checkbox"/> watershed improvements |
| <input checked="" type="checkbox"/> preservation/ exclusion | <input type="checkbox"/> culvert rehabilitation/ replacement |
| <input type="checkbox"/> maintenance | <input type="checkbox"/> signs |

Comments

Power line through watershed, trail and old road/ trail in buffer. Head-cut at top of reach, some bank erosion throughout reach.





Stream Condition – Site: S16

Map Grid Location: F10 Site visit date/ team): 8/19/15 / JZ Drainage Area (Sq. Mi.): 2.92

Stream name & Location: Reasonover Creek along trail

Streambed Substrate: Cobble, boulder Length (ft): +/- 635 Bankfull Width (ft): +/- 30

Stream Condition and Function: Score from 0 to 4 indicating natural stream integrity and health (circle contributing factors): 0 = very poor; 1 = poor; 2 = fair; 3 = good; 4 = excellent

1. Site and Watershed Conditions	3
<input checked="" type="checkbox"/> stormwater input <input type="checkbox"/> trampled banks <input type="checkbox"/> trail crossing <input type="checkbox"/> bridge/culvert/armoring	<input checked="" type="checkbox"/> sediment input <input type="checkbox"/> equine/dog impacts <input checked="" type="checkbox"/> trail in buffer <input type="checkbox"/> utilities
2. Channel Morphology and Condition	3
<input type="checkbox"/> overwide <input type="checkbox"/> straightened <input type="checkbox"/> head-cutting <input type="checkbox"/> high bed scour	<input type="checkbox"/> incised <input type="checkbox"/> eroding banks <input type="checkbox"/> lack of bedform diversity <input checked="" type="checkbox"/> excessive sediment deposition
3. Floodplain Morphology	3
<input type="checkbox"/> incised channel <input type="checkbox"/> floodplain fill/ levees	<input checked="" type="checkbox"/> entrenched channel <input type="checkbox"/> irregular/ obstructed floodplain
4. Vegetation	2
<input checked="" type="checkbox"/> narrow buffer width <input type="checkbox"/> poor overstory/tree cover	<input type="checkbox"/> invasive plants (banks/floodplain) <input checked="" type="checkbox"/> bare areas/mineral soil (banks/floodplain)
5. Habitat	4
<input type="checkbox"/> lack of woody debris <input type="checkbox"/> lack of diverse bedform/ flow	<input type="checkbox"/> poor water quality (turbid, algae, temperature) <input type="checkbox"/> lack of fine roots, leaf packs, coarse substrate
Score (of 20) and Rating (Poor 0-7; Fair 8-12; Good 13-17; Excellent 18-20)	15

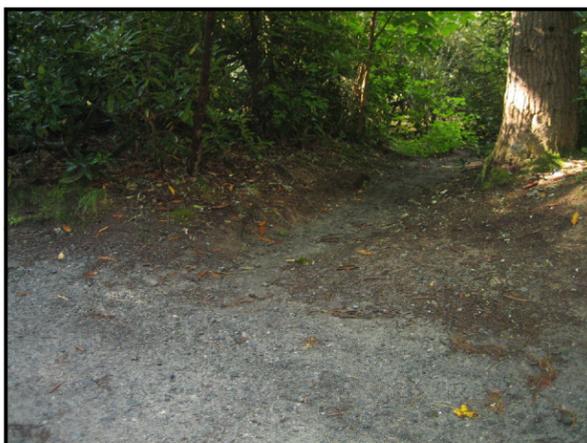
Potential Solutions

- | | |
|---|--|
| <input checked="" type="checkbox"/> relocate/close trail | <input type="checkbox"/> trail crossing improvement |
| <input checked="" type="checkbox"/> vegetation planting | <input type="checkbox"/> mechanical grading |
| <input type="checkbox"/> in-stream structures | <input type="checkbox"/> watershed improvements |
| <input checked="" type="checkbox"/> preservation/ exclusion | <input type="checkbox"/> culvert rehabilitation/ replacement |
| <input type="checkbox"/> maintenance | <input type="checkbox"/> signs |

Comments

Trail within buffer, resulting in reduced vegetation and sediment input.





Stream Condition – Site: S17

Map Grid Location: E5 Site visit date/ team): 8/19/15 / JZ Drainage Area (Sq. Mi.): 35.6

Stream name & Location: Little River at Hooker Falls Road

Streambed Substrate: Boulder, bedrock Length (ft): +/- 810 Bankfull Width (ft): +/- 50

Stream Condition and Function: Score from 0 to 4 indicating natural stream integrity and health (circle contributing factors): *0 = very poor; 1 = poor; 2 = fair; 3 = good; 4 = excellent*

1. Site and Watershed Conditions	1
<input type="checkbox"/> stormwater input	<input checked="" type="checkbox"/> sediment input
<input checked="" type="checkbox"/> trampled banks	<input checked="" type="checkbox"/> equine/dog impacts
<input type="checkbox"/> trail crossing	<input checked="" type="checkbox"/> trail in buffer
<input type="checkbox"/> bridge/culvert/armoring	<input checked="" type="checkbox"/> utilities
2. Channel Morphology and Condition	2
<input type="checkbox"/> overwide	<input type="checkbox"/> incised
<input type="checkbox"/> straightened	<input checked="" type="checkbox"/> eroding banks
<input type="checkbox"/> head-cutting	<input type="checkbox"/> lack of bedform diversity
<input type="checkbox"/> high bed scour	<input checked="" type="checkbox"/> excessive sediment deposition
3. Floodplain Morphology	4
<input type="checkbox"/> incised channel	<input type="checkbox"/> entrenched channel
<input type="checkbox"/> floodplain fill/ levees	<input type="checkbox"/> irregular/ obstructed floodplain
4. Vegetation	2
<input checked="" type="checkbox"/> narrow buffer width	<input type="checkbox"/> invasive plants (banks/floodplain)
<input checked="" type="checkbox"/> poor overstory/tree cover	<input checked="" type="checkbox"/> bare areas/mineral soil (banks/floodplain)
5. Habitat	3
<input checked="" type="checkbox"/> lack of woody debris	<input type="checkbox"/> poor water quality (turbid, algae, temperature)
<input type="checkbox"/> lack of diverse bedform/ flow	<input checked="" type="checkbox"/> lack of fine roots, leaf packs, coarse substrate
Score (of 20) and Rating (Poor 0-7; Fair 8-12; Good 13-17; Excellent 18-20)	12

Potential Solutions

- | | |
|---|--|
| <input checked="" type="checkbox"/> relocate/close trail | <input type="checkbox"/> trail crossing improvement |
| <input checked="" type="checkbox"/> vegetation planting | <input type="checkbox"/> mechanical grading |
| <input type="checkbox"/> in-stream structures | <input type="checkbox"/> watershed improvements |
| <input checked="" type="checkbox"/> preservation/ exclusion | <input type="checkbox"/> culvert rehabilitation/ replacement |
| <input type="checkbox"/> maintenance | <input checked="" type="checkbox"/> signs |

Comments

Human access along Hooker Falls Road has led to excessive bare areas and sediment input. Potential solutions include relocating trail away from river and revegetating.

Legend

- Assessed Streams
- - - Trails
- Roads
- Streams
- Major Contour
- Minor Contour

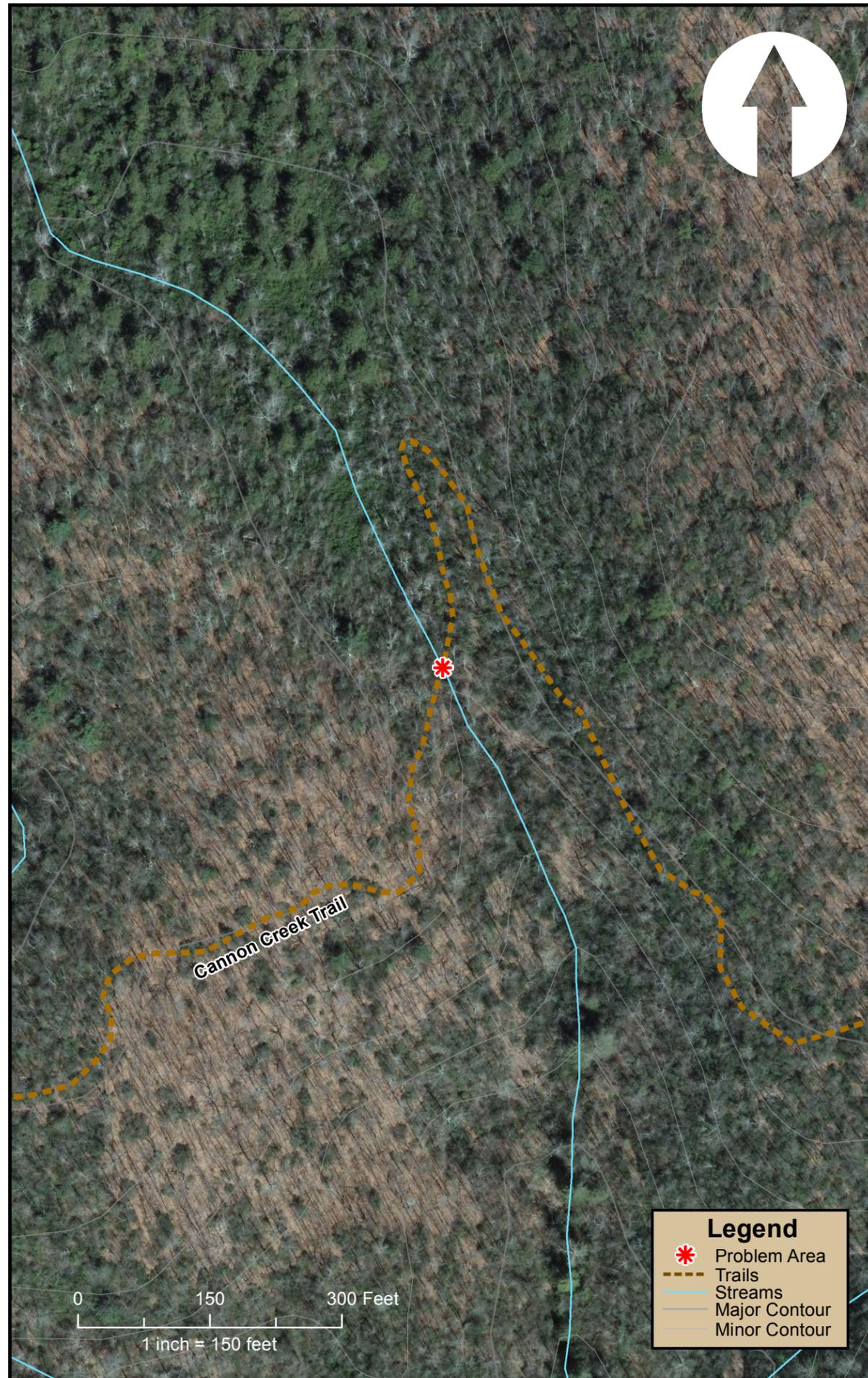
0 150 300 Feet
1 inch = 150 feet

APPENDIX F

Area of Concern Assessments

Area of Concern – Site: P01

Map Grid Location: B9 Site visit date/ team): 4/13/15/ BK, JZ. Drainage Area (Sq. Mi.): < 0.1
 Name & Location: Stream crossing at Cannon Creek Trail



- 1. Culvert (diameter/material/length):** _____
- | | |
|--|--|
| <input type="checkbox"/> clogged | <input type="checkbox"/> aquatic organism passage/ perched |
| <input type="checkbox"/> crushed | <input type="checkbox"/> erosion (upstream/ downstream) |
| <input type="checkbox"/> lack of natural bed | <input type="checkbox"/> piping |
| <input type="checkbox"/> safety hazard | <input type="checkbox"/> overtopping |

- 2. Trail/ Road Impact (trail/ road name):** Cannon Creek Trail
- | | |
|---|--|
| <input type="checkbox"/> stormwater input | <input checked="" type="checkbox"/> sediment input |
| <input type="checkbox"/> bridge | <input type="checkbox"/> utilities |
| <input checked="" type="checkbox"/> unstable trail crossing | <input checked="" type="checkbox"/> erosion |
| <input type="checkbox"/> safety hazard | <input checked="" type="checkbox"/> human impact (hiking/biking) |
| <input checked="" type="checkbox"/> missing vegetation | <input type="checkbox"/> equine/dog impacts |

- 3. Upland/ Stormwater**
- | | |
|--|--|
| <input type="checkbox"/> nonpoint source pollution | <input type="checkbox"/> upland erosion |
| <input type="checkbox"/> pollutant point source | <input type="checkbox"/> unvegetated upland area |

- 4. Lake/Pond/ Reservoir (reservoir name):** _____
- | | |
|--|---|
| <input type="checkbox"/> erosion | <input type="checkbox"/> lack of vegetation |
| <input type="checkbox"/> equine impact | <input type="checkbox"/> human impact (hiking/biking) |
| <input type="checkbox"/> safety hazard | <input type="checkbox"/> water quality (temperature, algae, feces, fecal) |

- 5. Other Problem Area(s)** (list contributing factors)

Potential Solutions

- | | |
|--|---|
| <input type="checkbox"/> relocate trail/close trail/road | <input checked="" type="checkbox"/> trail/road crossing improvement |
| <input checked="" type="checkbox"/> vegetation/ shoreline planting | <input type="checkbox"/> mechanical grading |
| <input type="checkbox"/> stormwater treatment | <input type="checkbox"/> animal watering |
| <input type="checkbox"/> human/ animal exclusion | <input type="checkbox"/> culvert rehabilitation/ replacement |
| <input type="checkbox"/> signs | <input type="checkbox"/> culvert daylighting |
| <input type="checkbox"/> maintenance | <input type="checkbox"/> bridge replacement/improvement |

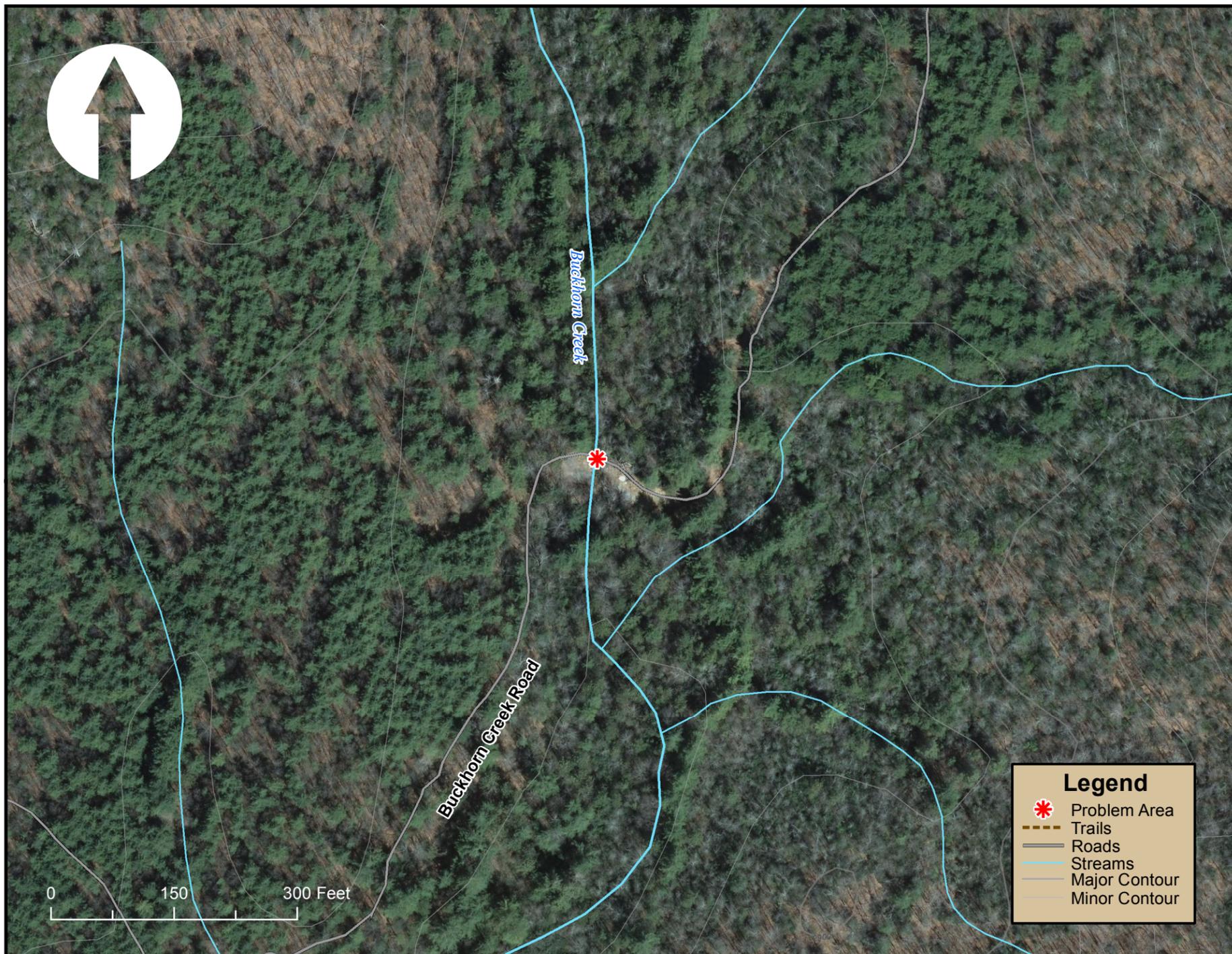
Comments

Minor erosion and sediment deposition due to trail crossing of stream.



Area of Concern – Site: P02

Map Grid Location: C9 Site visit date/ team): 4/13/15/ BK, JZ Drainage Area (Sq. Mi.): 0.52
 Name & Location: Buckhorn Creek Road at Buckhorn Creek



- 1. Culvert (diameter/material/length):** _____
- | | |
|--|--|
| <input type="checkbox"/> clogged | <input type="checkbox"/> aquatic organism passage/ perched |
| <input type="checkbox"/> crushed | <input type="checkbox"/> erosion (upstream/ downstream) |
| <input type="checkbox"/> lack of natural bed | <input type="checkbox"/> piping |
| <input type="checkbox"/> safety hazard | <input type="checkbox"/> overtopping |

- 2. Trail/ Road Impact (trail/ road name):** Buckhorn Creek Road
- | | |
|---|--|
| <input checked="" type="checkbox"/> stormwater input | <input checked="" type="checkbox"/> sediment input |
| <input type="checkbox"/> bridge | <input type="checkbox"/> utilities |
| <input checked="" type="checkbox"/> unstable trail crossing | <input type="checkbox"/> erosion |
| <input type="checkbox"/> safety hazard | <input checked="" type="checkbox"/> human impact (hiking/biking) |
| <input checked="" type="checkbox"/> missing vegetation | <input type="checkbox"/> equine/ dog impacts |

- 3. Upland/ Stormwater**
- | | |
|--|--|
| <input type="checkbox"/> nonpoint source pollution | <input type="checkbox"/> upland erosion |
| <input type="checkbox"/> pollutant point source | <input type="checkbox"/> unvegetated upland area |

- 4. Lake/Pond/ Reservoir (reservoir name):** _____
- | | |
|--|---|
| <input type="checkbox"/> erosion | <input type="checkbox"/> lack of vegetation |
| <input type="checkbox"/> equine impact | <input type="checkbox"/> human impact (hiking/biking) |
| <input type="checkbox"/> safety hazard | <input type="checkbox"/> water quality (temperature, algae, geese, fecal) |

5. Other Problem Area(s) (list contributing factors)

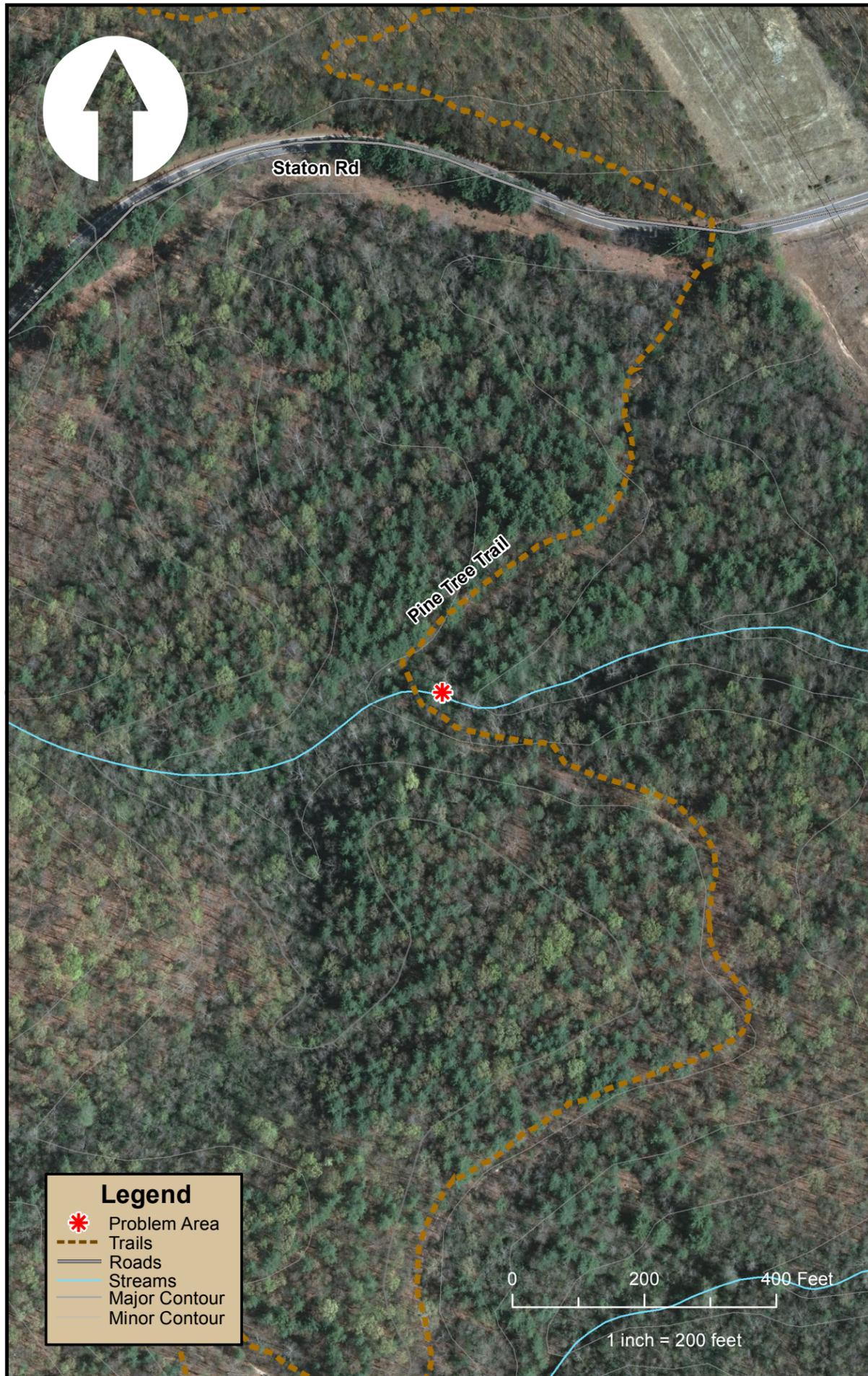
Potential Solutions

- | | |
|--|---|
| <input type="checkbox"/> relocate trail/close trail/road | <input checked="" type="checkbox"/> trail/road crossing improvement |
| <input checked="" type="checkbox"/> vegetation/ shoreline planting | <input type="checkbox"/> mechanical grading |
| <input type="checkbox"/> stormwater treatment | <input type="checkbox"/> animal watering |
| <input type="checkbox"/> human/ animal exclusion | <input type="checkbox"/> culvert rehabilitation/ replacement |
| <input type="checkbox"/> signs | <input type="checkbox"/> culvert daylighting |
| <input type="checkbox"/> maintenance | <input type="checkbox"/> bridge replacement/improvement |

Comments

Road crossing of creek appears to be overwide and contributing fine sediment. Re-design of crossing could improve water quality.





Area of Concern – Site: P03

Map Grid Location: D7 Site visit date/ team): 8/26/15 / JZ Drainage Area (Sq. Mi.): < 0.1
 Name & Location: Tributary at Pine Tree Trail

1. **Culvert (diameter/material/length):** Not Observed

<input type="checkbox"/> clogged	<input checked="" type="checkbox"/> aquatic organism passage/ perched
<input type="checkbox"/> crushed	<input checked="" type="checkbox"/> erosion (upstream/ downstream)
<input type="checkbox"/> lack of natural bed	<input type="checkbox"/> piping
<input type="checkbox"/> safety hazard	<input type="checkbox"/> overtopping
2. **Trail/ Road Impact (trail/ road name):** Pine Tree Trail

<input type="checkbox"/> stormwater input	<input checked="" type="checkbox"/> sediment input
<input type="checkbox"/> bridge	<input type="checkbox"/> utilities
<input type="checkbox"/> unstable trail crossing	<input type="checkbox"/> erosion
<input type="checkbox"/> safety hazard	<input checked="" type="checkbox"/> human impact (hiking/biking)
<input type="checkbox"/> missing vegetation	<input type="checkbox"/> equine/ dog impacts
3. **Upland/ Stormwater**

<input type="checkbox"/> nonpoint source pollution	<input type="checkbox"/> upland erosion
<input type="checkbox"/> pollutant point source	<input type="checkbox"/> unvegetated upland area
4. **Lake/Pond/ Reservoir (reservoir name):** _____

<input type="checkbox"/> erosion	<input type="checkbox"/> lack of vegetation
<input type="checkbox"/> equine impact	<input type="checkbox"/> human impact (hiking/biking)
<input type="checkbox"/> safety hazard	<input type="checkbox"/> water quality (temperature, algae, geese, fecal)
5. **Other Problem Area(s)** (list contributing factors)

Potential Solutions

- | | |
|---|---|
| <input checked="" type="checkbox"/> relocate trail/close trail/road | <input checked="" type="checkbox"/> trail/road crossing improvement |
| <input type="checkbox"/> vegetation/ shoreline planting | <input type="checkbox"/> mechanical grading |
| <input type="checkbox"/> stormwater treatment | <input type="checkbox"/> animal watering |
| <input type="checkbox"/> human/ animal exclusion | <input type="checkbox"/> culvert rehabilitation/ replacement |
| <input type="checkbox"/> signs | <input type="checkbox"/> culvert daylighting |
| <input type="checkbox"/> maintenance | <input type="checkbox"/> bridge replacement/improvement |

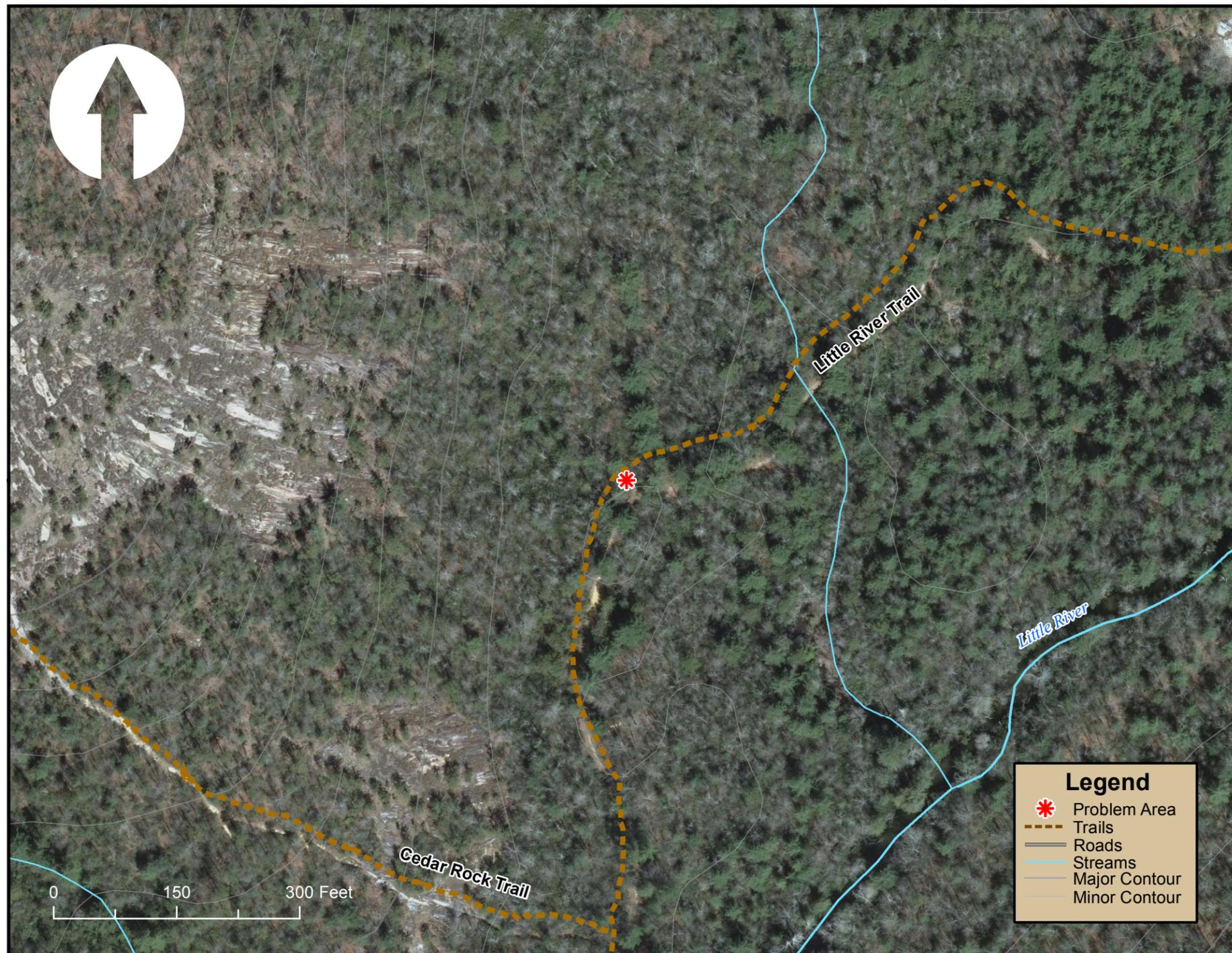
Comments

Some sediment input from trail. Channel bank erosion downstream of trail at culvert outlet.



Area of Concern – Site: P04

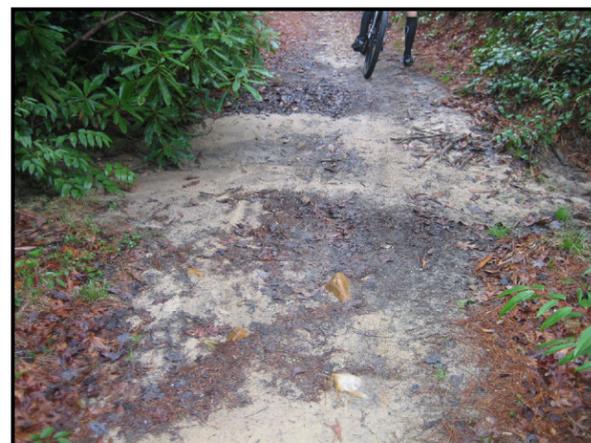
Map Grid Location: D9 Site visit date/ team): 4/13/15/ BK, JZ Drainage Area (Sq. Mi.): < 0.1
 Name & Location: Drainage across Little River Trail



1. **Culvert (diameter/material/length):** _____
 clogged aquatic organism passage/ perched
 crushed erosion (upstream/ downstream)
 lack of natural bed piping
 safety hazard overtopping
2. **Trail/ Road Impact (trail/ road name):** Little River Trail
 stormwater input sediment input
 bridge utilities
 unstable trail crossing erosion
 safety hazard human impact (hiking/biking)
 missing vegetation equine/dog impacts
3. **Upland/ Stormwater**
 nonpoint source pollution upland erosion
 pollutant point source unvegetated upland area
4. **Lake/Pond/ Reservoir (reservoir name):** _____
 erosion lack of vegetation
 equine impact human impact (hiking/biking)
 safety hazard water quality (temperature, algae, geese, fecal)
5. **Other Problem Area(s)** (list contributing factors)

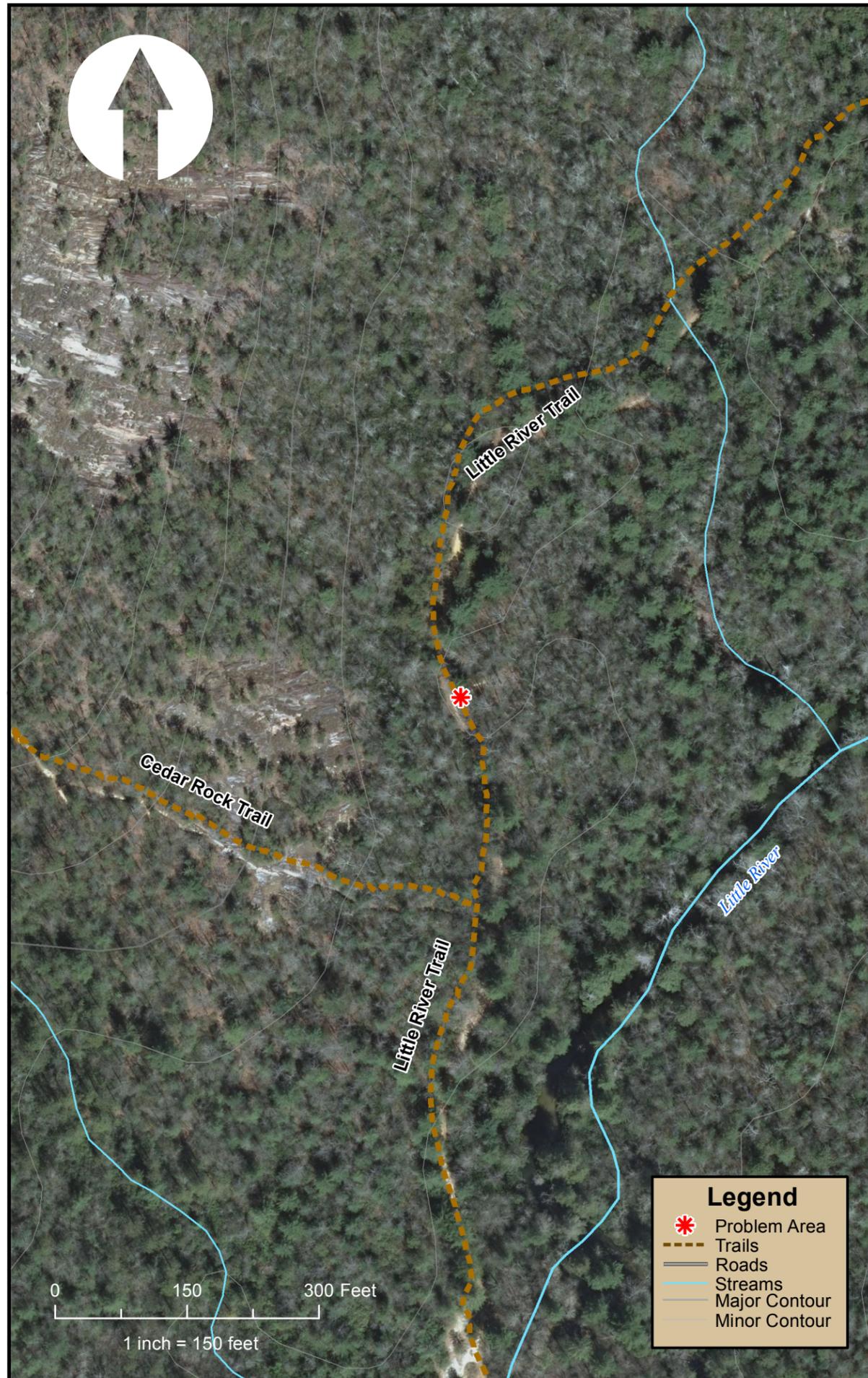
- Potential Solutions**
- | | |
|--|---|
| <input type="checkbox"/> relocate trail/close trail/road | <input checked="" type="checkbox"/> trail/road crossing improvement |
| <input type="checkbox"/> vegetation/ shoreline planting | <input type="checkbox"/> mechanical grading |
| <input type="checkbox"/> stormwater treatment | <input type="checkbox"/> animal watering |
| <input type="checkbox"/> human/ animal exclusion | <input type="checkbox"/> culvert rehabilitation/ replacement |
| <input type="checkbox"/> signs | <input type="checkbox"/> culvert daylighting |
| <input type="checkbox"/> maintenance | <input type="checkbox"/> bridge replacement/improvement |

Comments
 Stormwater drainage crosses Little River Trail, with trail serving as sediment source to Little River.



Area of Concern – Site: P05

Map Grid Location: D9 Site visit date/ team): 4/13/15/ BK, JZ Drainage Area (Sq. Mi.): < 0.1
 Name & Location: Drainage across Little River Trail



1. **Culvert (diameter/material/length):** _____

<input type="checkbox"/> clogged	<input type="checkbox"/> aquatic organism passage/ perched
<input type="checkbox"/> crushed	<input type="checkbox"/> erosion (upstream/ downstream)
<input type="checkbox"/> lack of natural bed	<input type="checkbox"/> piping
<input type="checkbox"/> safety hazard	<input type="checkbox"/> overtopping

2. **Trail/ Road Impact (trail/ road name):** Little River Trail

<input type="checkbox"/> stormwater input	<input checked="" type="checkbox"/> sediment input
<input type="checkbox"/> bridge	<input type="checkbox"/> utilities
<input checked="" type="checkbox"/> unstable trail crossing	<input checked="" type="checkbox"/> erosion
<input type="checkbox"/> safety hazard	<input checked="" type="checkbox"/> human impact (hiking/biking)
<input type="checkbox"/> missing vegetation	<input type="checkbox"/> equine/dog impacts

3. **Upland/ Stormwater**

<input type="checkbox"/> nonpoint source pollution	<input type="checkbox"/> upland erosion
<input type="checkbox"/> pollutant point source	<input type="checkbox"/> unvegetated upland area

4. **Lake/Pond/ Reservoir (reservoir name):** _____

<input type="checkbox"/> erosion	<input type="checkbox"/> lack of vegetation
<input type="checkbox"/> equine impact	<input type="checkbox"/> human impact (hiking/biking)
<input type="checkbox"/> safety hazard	<input type="checkbox"/> water quality (temperature, algae, geese, fecal)

5. **Other Problem Area(s)** (list contributing factors)

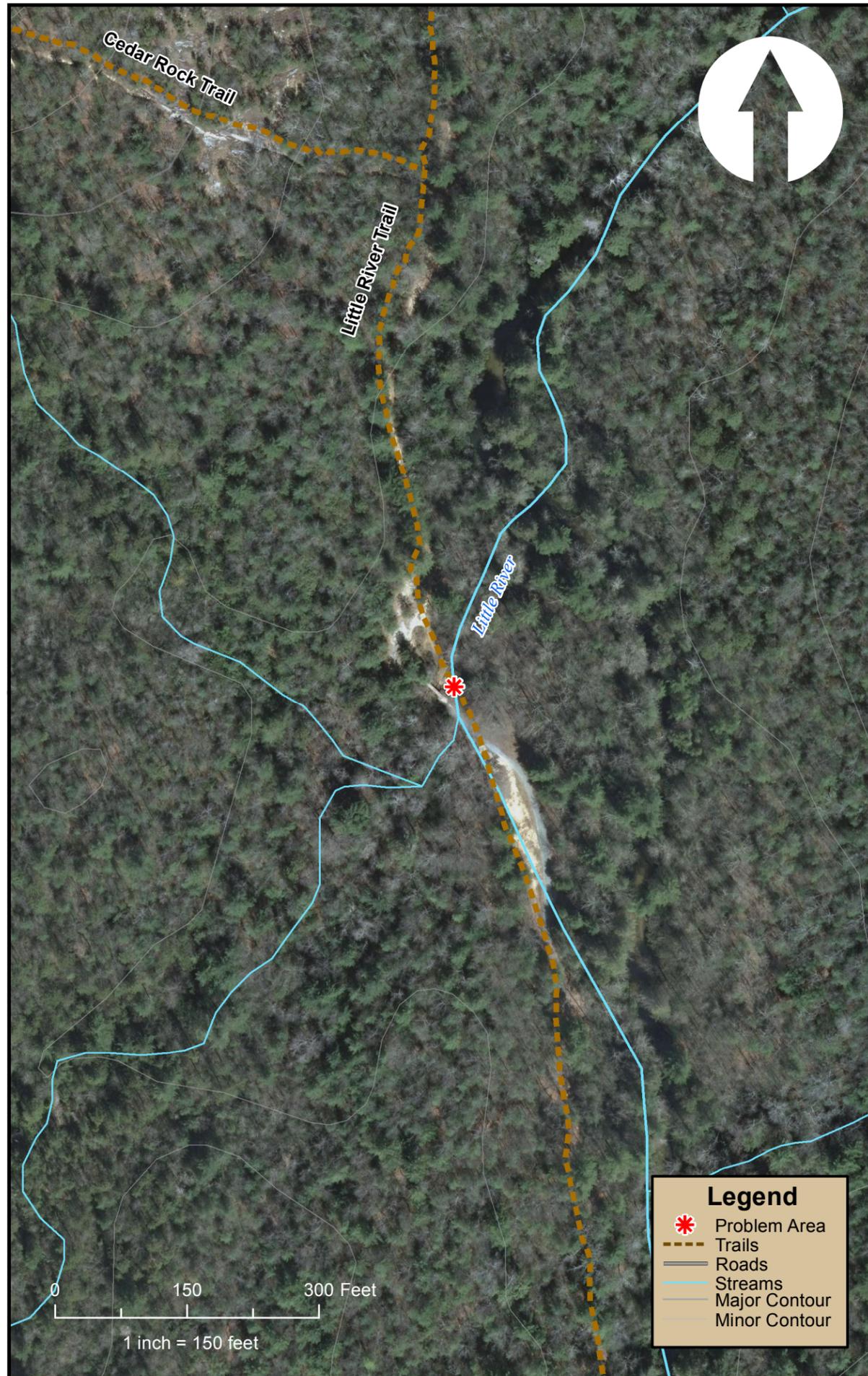
- Potential Solutions**
- | | |
|--|---|
| <input type="checkbox"/> relocate trail/close trail/road | <input checked="" type="checkbox"/> trail/road crossing improvement |
| <input type="checkbox"/> vegetation/ shoreline planting | <input type="checkbox"/> mechanical grading |
| <input type="checkbox"/> stormwater treatment | <input type="checkbox"/> animal watering |
| <input type="checkbox"/> human/ animal exclusion | <input type="checkbox"/> culvert rehabilitation/ replacement |
| <input type="checkbox"/> signs | <input type="checkbox"/> culvert daylighting |
| <input type="checkbox"/> maintenance | <input type="checkbox"/> bridge replacement/improvement |

Comments
 Stormwater drainage crosses Little River Trail, with trail serving as sediment source to Little River.



Area of Concern – Site: P06

Map Grid Location: D10 Site visit date/ team): 4/13/15/ BK, JZ Drainage Area (Sq. Mi.): 1.1
 Name & Location: Bridge/ crossing near Little River



- 1. Culvert (diameter/material/length):** _____
- | | |
|--|--|
| <input type="checkbox"/> clogged | <input type="checkbox"/> aquatic organism passage/ perched |
| <input type="checkbox"/> crushed | <input type="checkbox"/> erosion (upstream/ downstream) |
| <input type="checkbox"/> lack of natural bed | <input type="checkbox"/> piping |
| <input type="checkbox"/> safety hazard | <input type="checkbox"/> overtopping |

- 2. Trail/ Road Impact (trail/ road name):** Little River Trail
- | | |
|---|--|
| <input checked="" type="checkbox"/> stormwater input | <input checked="" type="checkbox"/> sediment input |
| <input checked="" type="checkbox"/> bridge | <input type="checkbox"/> utilities |
| <input checked="" type="checkbox"/> unstable trail crossing | <input type="checkbox"/> erosion |
| <input checked="" type="checkbox"/> safety hazard | <input checked="" type="checkbox"/> human impact (hiking/biking) |
| <input checked="" type="checkbox"/> missing vegetation | <input checked="" type="checkbox"/> equine/dog impacts |

- 3. Upland/ Stormwater**
- | | |
|--|--|
| <input type="checkbox"/> nonpoint source pollution | <input type="checkbox"/> upland erosion |
| <input type="checkbox"/> pollutant point source | <input type="checkbox"/> unvegetated upland area |

- 4. Lake/Pond/ Reservoir (reservoir name):** _____
- | | |
|--|---|
| <input type="checkbox"/> erosion | <input type="checkbox"/> lack of vegetation |
| <input type="checkbox"/> equine impact | <input type="checkbox"/> human impact (hiking/biking) |
| <input type="checkbox"/> safety hazard | <input type="checkbox"/> water quality (temperature, algae, geese, fecal) |

5. Other Problem Area(s) list contributing factors)

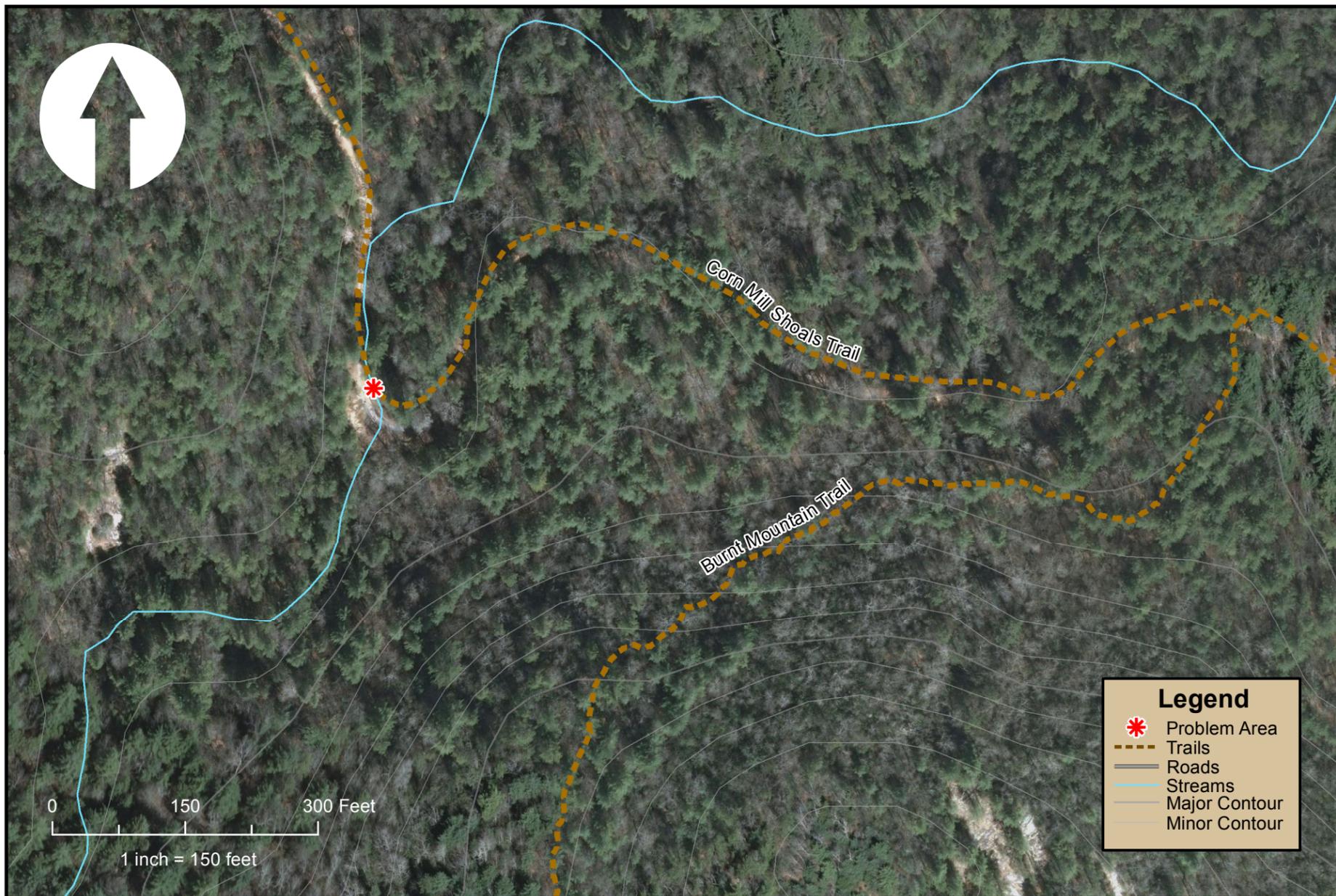
- Potential Solutions**
- | | |
|---|---|
| <input checked="" type="checkbox"/> relocate trail/close trail/road | <input checked="" type="checkbox"/> trail/road crossing improvement |
| <input checked="" type="checkbox"/> vegetation/ shoreline planting | <input type="checkbox"/> mechanical grading |
| <input type="checkbox"/> stormwater treatment | <input type="checkbox"/> animal watering |
| <input type="checkbox"/> human/ animal exclusion | <input type="checkbox"/> culvert rehabilitation/ replacement |
| <input type="checkbox"/> signs | <input type="checkbox"/> culvert daylighting |
| <input type="checkbox"/> maintenance | <input checked="" type="checkbox"/> bridge replacement/improvement |

Comments
 Tributary to Little River is crossed by bridge and ford. Bridge is in poor condition. Ford is over widened with fine sediment in streambed. Entire crossing could be reconstructed for increased stability/ safety.



Area of Concern – Site: P07

Map Grid Location: D10 Site visit date/ team): 4/13/15/ BK, JZ Drainage Area (Sq. Mi.): 0.89
 Name & Location: Culvert under Corn Mill Shoals Trail



- 1. Culvert (diameter/material/length):** _____
- | | |
|--|--|
| <input type="checkbox"/> clogged | <input type="checkbox"/> aquatic organism passage/ perched |
| <input type="checkbox"/> crushed | <input type="checkbox"/> erosion (upstream/ downstream) |
| <input type="checkbox"/> lack of natural bed | <input type="checkbox"/> piping |
| <input type="checkbox"/> safety hazard | <input type="checkbox"/> overtopping |

- 2. Trail/ Road Impact (trail/ road name):** Corn Mill Shoals Trail
- | | |
|--|--|
| <input checked="" type="checkbox"/> stormwater input | <input checked="" type="checkbox"/> sediment input |
| <input type="checkbox"/> bridge | <input type="checkbox"/> utilities |
| <input type="checkbox"/> unstable trail crossing | <input type="checkbox"/> erosion |
| <input type="checkbox"/> safety hazard | <input checked="" type="checkbox"/> human impact (hiking/biking) |
| <input checked="" type="checkbox"/> missing vegetation | <input type="checkbox"/> equine/dog impacts |

- 3. Upland/ Stormwater**
- | | |
|--|--|
| <input type="checkbox"/> nonpoint source pollution | <input type="checkbox"/> upland erosion |
| <input type="checkbox"/> pollutant point source | <input type="checkbox"/> unvegetated upland area |

- 4. Lake/Pond/ Reservoir (reservoir name):** _____
- | | |
|--|---|
| <input type="checkbox"/> erosion | <input type="checkbox"/> lack of vegetation |
| <input type="checkbox"/> equine impact | <input type="checkbox"/> human impact (hiking/biking) |
| <input type="checkbox"/> safety hazard | <input type="checkbox"/> water quality (temperature, algae, geese, fecal) |

5. Other Problem Area(s) list contributing factors)

Legend

* Problem Area

--- Trails

— Roads

— Streams

— Major Contour

— Minor Contour

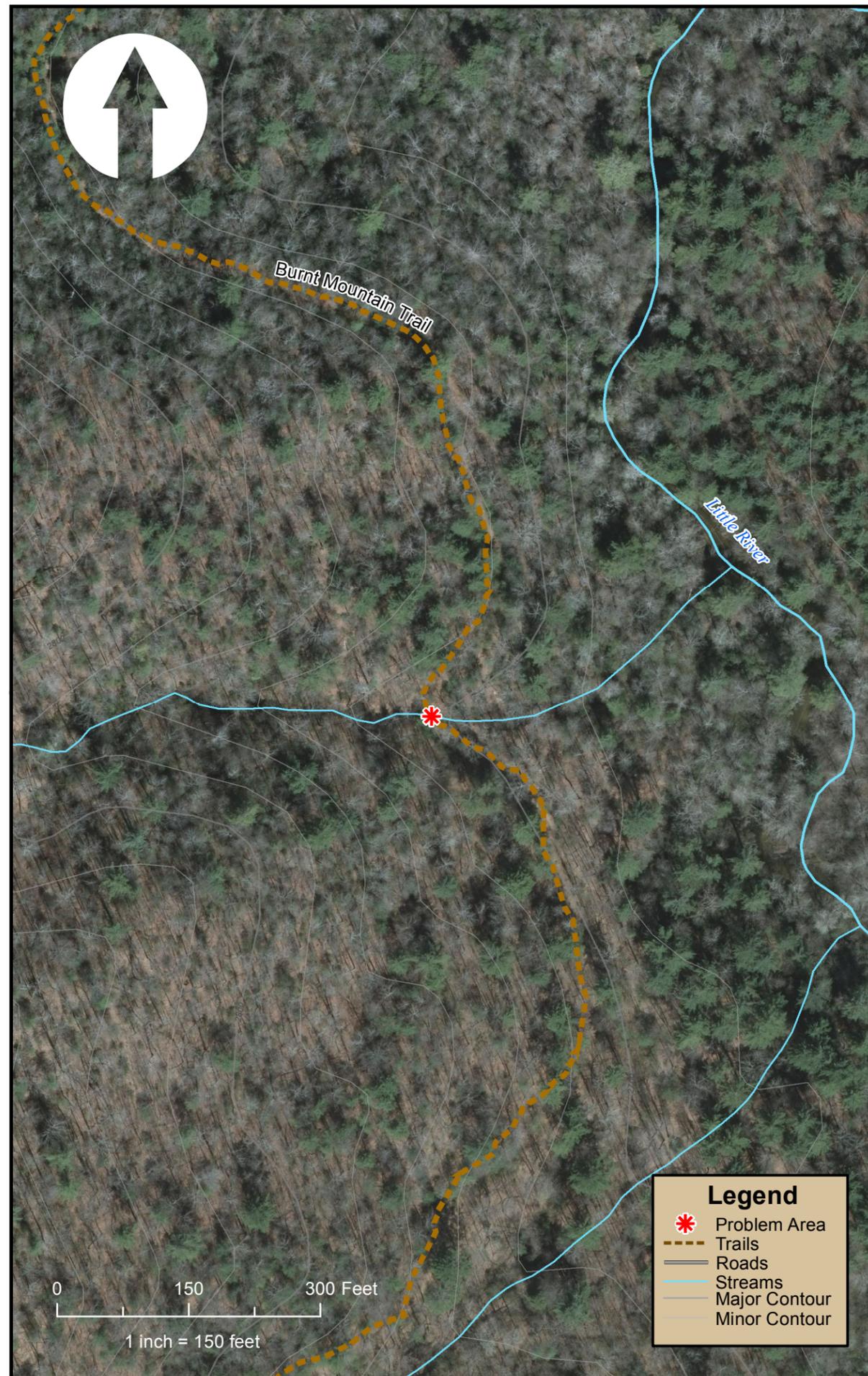
- Potential Solutions**
- | | |
|--|---|
| <input type="checkbox"/> relocate trail/close trail/road | <input checked="" type="checkbox"/> trail/road crossing improvement |
| <input checked="" type="checkbox"/> vegetation/ shoreline planting | <input type="checkbox"/> mechanical grading |
| <input type="checkbox"/> stormwater treatment | <input type="checkbox"/> animal watering |
| <input type="checkbox"/> human/ animal exclusion | <input type="checkbox"/> culvert rehabilitation/ replacement |
| <input type="checkbox"/> signs | <input type="checkbox"/> culvert daylighting |
| <input type="checkbox"/> maintenance | <input type="checkbox"/> bridge replacement/improvement |

Comments
 Minor sediment/ stormwater input to stream at trail crossing – install vegetation and/ or regrade trail for improvement.



Area of Concern – Site: P08

Map Grid Location: D11 Site visit date/ team): 4/13/15/ BK, JZ Drainage Area (Sq. Mi.): < 0.1
 Name & Location: Drainage across Burnt Mountain Trail



- Culvert (diameter/material/length):** 12"/ CPP
 - clogged
 - crushed
 - lack of natural bed
 - safety hazard
 - aquatic organism passage/ perched
 - erosion (upstream/ downstream)
 - piping
 - overtopping
- Trail/ Road Impact (trail/ road name):** _____
 - stormwater input
 - bridge
 - unstable trail crossing
 - safety hazard
 - missing vegetation
 - sediment input
 - utilities
 - erosion
 - human impact (hiking/biking)
 - equine/ dog impacts
- Upland/ Stormwater**
 - nonpoint source pollution
 - pollutant point source
 - upland erosion
 - unvegetated upland area
- Lake/Pond/ Reservoir (reservoir name):** _____
 - erosion
 - equine impact
 - safety hazard
 - lack of vegetation
 - human impact (hiking/biking)
 - water quality (temperature, algae, geese, fecal)
- Other Problem Area(s)** (list contributing factors)

Potential Solutions

- relocate trail/close trail/road
- vegetation/ shoreline planting
- stormwater treatment
- human/ animal exclusion
- signs
- maintenance
- trail/road crossing improvement
- mechanical grading
- animal watering
- culvert rehabilitation/ replacement
- culvert daylighting
- bridge replacement/improvement

Comments

Stream banks eroded, especially upstream of culvert. Culvert appears to be clogged with baseflow piping through earth.

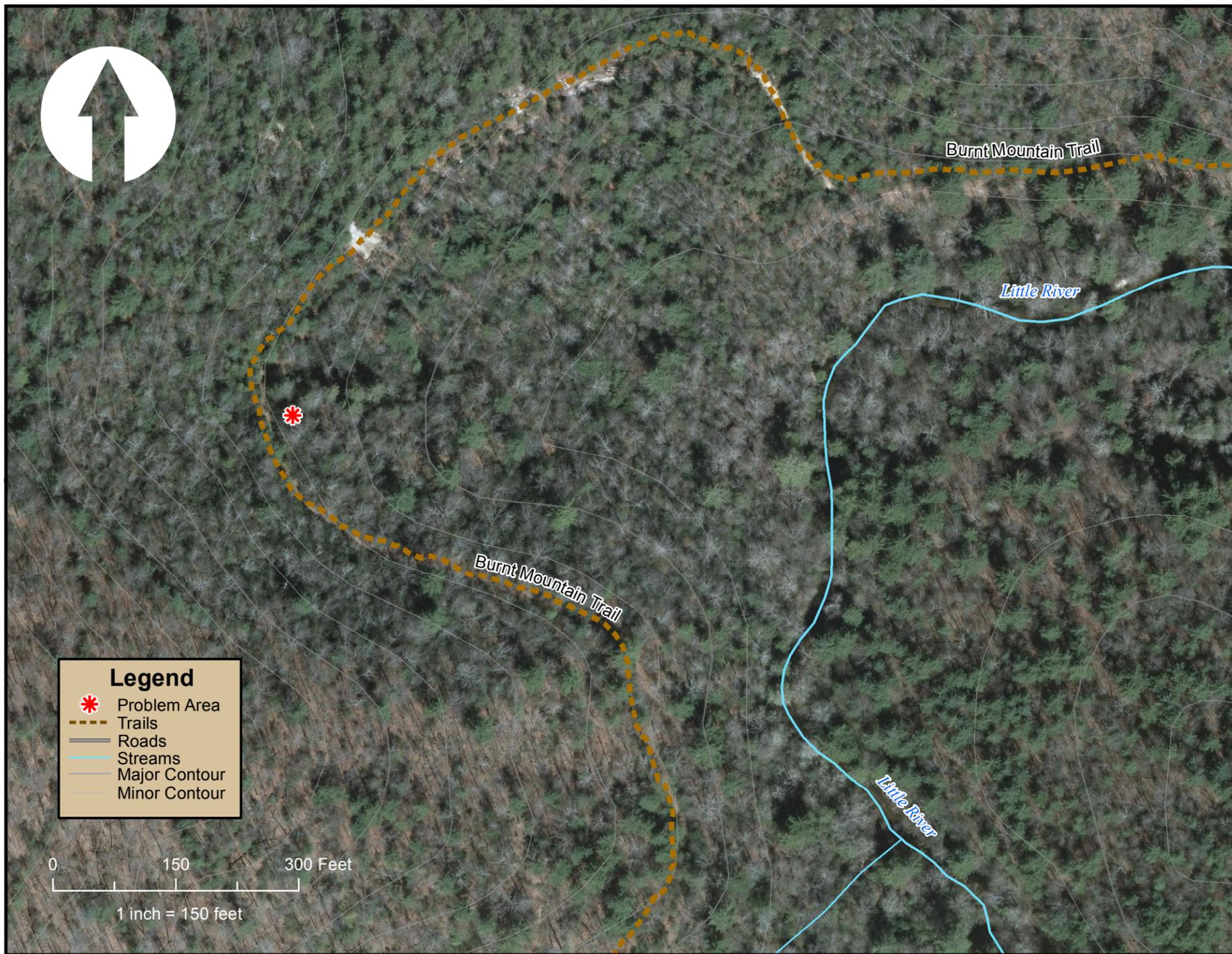
Legend

- * Problem Area
- Trails
- Roads
- Streams
- Major Contour
- Minor Contour



Area of Concern – Site: P09

Map Grid Location: D11 Site visit date/ team): 4/13/15/ BK, JZ Drainage Area (Sq. Mi.): < 0.1
 Name & Location: Drainage across Burnt Mountain Trail



1. **Culvert (diameter/material/length):** 12"/ CPP
- | | |
|--|--|
| <input type="checkbox"/> clogged | <input type="checkbox"/> aquatic organism passage/ perched |
| <input type="checkbox"/> crushed | <input checked="" type="checkbox"/> erosion (upstream/ downstream) |
| <input type="checkbox"/> lack of natural bed | <input type="checkbox"/> piping |
| <input type="checkbox"/> safety hazard | <input type="checkbox"/> overtopping |

2. **Trail/ Road Impact (trail/ road name):** _____
- | | |
|--|---|
| <input type="checkbox"/> stormwater input | <input type="checkbox"/> sediment input |
| <input type="checkbox"/> bridge | <input type="checkbox"/> utilities |
| <input type="checkbox"/> unstable trail crossing | <input type="checkbox"/> erosion |
| <input type="checkbox"/> safety hazard | <input type="checkbox"/> human impact (hiking/biking) |
| <input type="checkbox"/> missing vegetation | <input type="checkbox"/> equine/dog impacts |

3. **Upland/ Stormwater**
- | | |
|--|--|
| <input type="checkbox"/> nonpoint source pollution | <input type="checkbox"/> upland erosion |
| <input type="checkbox"/> pollutant point source | <input type="checkbox"/> unvegetated upland area |

4. **Lake/Pond/ Reservoir (reservoir name):** _____
- | | |
|--|---|
| <input type="checkbox"/> erosion | <input type="checkbox"/> lack of vegetation |
| <input type="checkbox"/> equine impact | <input type="checkbox"/> human impact (hiking/biking) |
| <input type="checkbox"/> safety hazard | <input type="checkbox"/> water quality (temperature, algae, geese, fecal) |

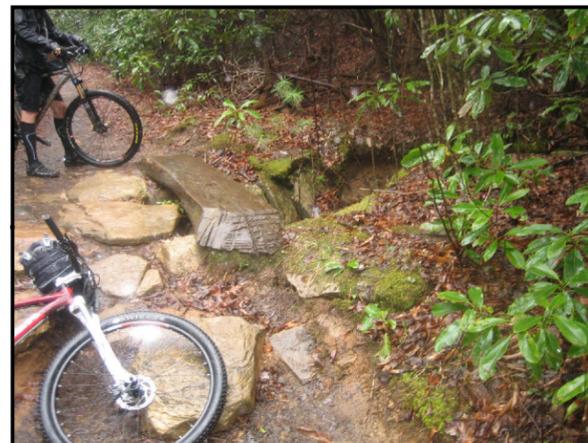
5. **Other Problem Area(s)** list contributing factors)

Potential Solutions

- | | |
|--|---|
| <input type="checkbox"/> relocate trail/close trail/road | <input checked="" type="checkbox"/> trail/road crossing improvement |
| <input type="checkbox"/> vegetation/ shoreline planting | <input type="checkbox"/> mechanical grading |
| <input type="checkbox"/> stormwater treatment | <input type="checkbox"/> animal watering |
| <input type="checkbox"/> human/ animal exclusion | <input checked="" type="checkbox"/> culvert rehabilitation/ replacement |
| <input type="checkbox"/> signs | <input type="checkbox"/> culvert daylighting |
| <input type="checkbox"/> maintenance | <input type="checkbox"/> bridge replacement/improvement |

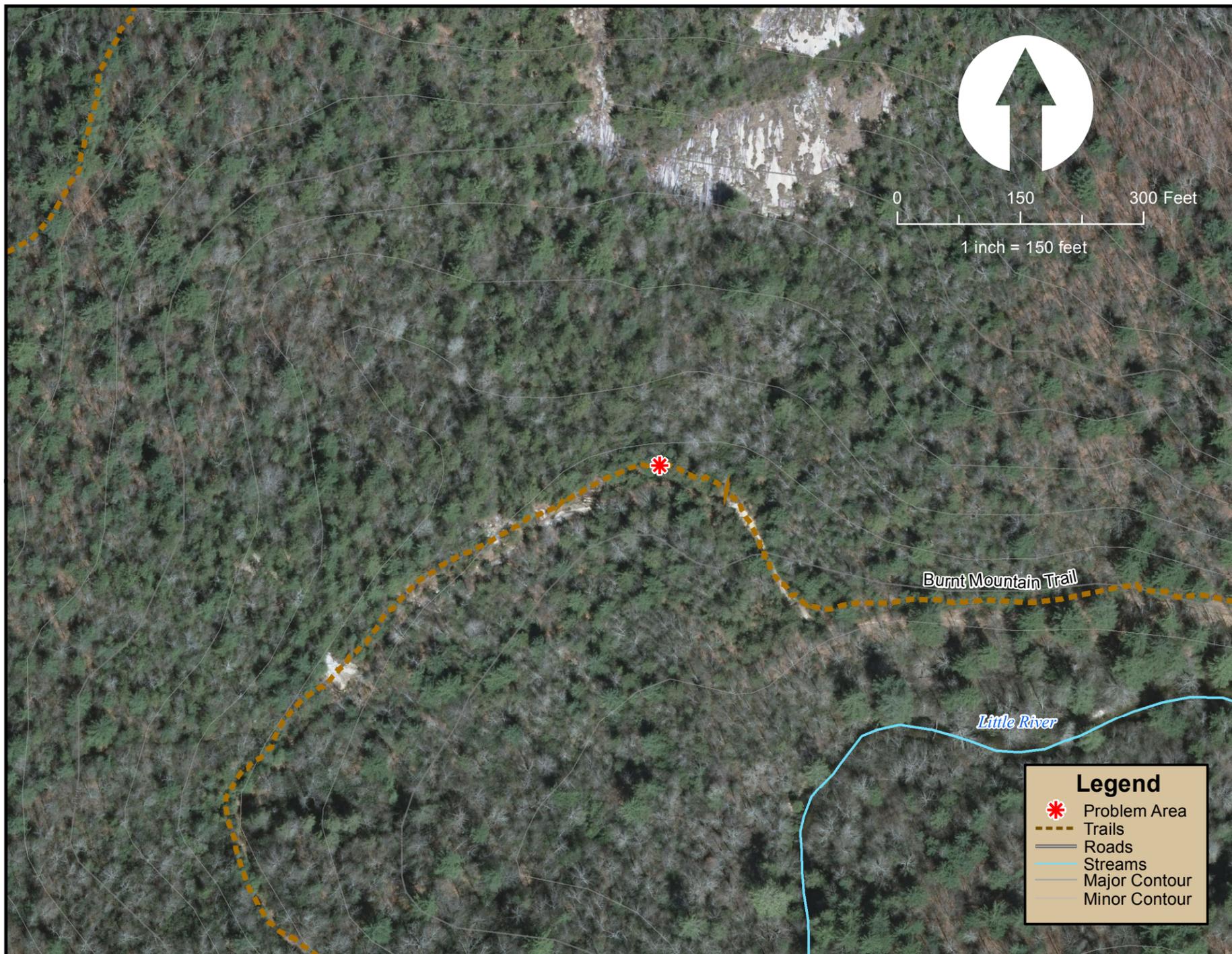
Comments

Stream banks eroded upstream/ downstream of culvert. Trail currently intact.



Area of Concern – Site: P10

Map Grid Location: D11 Site visit date/ team): 4/13/15/ BK, JZ Drainage Area (Sq. Mi.): < 0.1
 Name & Location: Drainage across Burnt Mountain Trail



- 1. Culvert (diameter/material/length):** 12"/ CPP
- | | |
|--|--|
| <input type="checkbox"/> clogged | <input type="checkbox"/> aquatic organism passage/ perched |
| <input type="checkbox"/> crushed | <input checked="" type="checkbox"/> erosion (upstream/ downstream) |
| <input type="checkbox"/> lack of natural bed | <input type="checkbox"/> piping |
| <input type="checkbox"/> safety hazard | <input type="checkbox"/> overtopping |

- 2. Trail/ Road Impact (trail/ road name):** _____
- | | |
|--|---|
| <input type="checkbox"/> stormwater input | <input type="checkbox"/> sediment input |
| <input type="checkbox"/> bridge | <input type="checkbox"/> utilities |
| <input type="checkbox"/> unstable trail crossing | <input type="checkbox"/> erosion |
| <input type="checkbox"/> safety hazard | <input type="checkbox"/> human impact (hiking/biking) |
| <input type="checkbox"/> missing vegetation | <input type="checkbox"/> equine/dog impacts |

- 3. Upland/ Stormwater**
- | | |
|--|--|
| <input type="checkbox"/> nonpoint source pollution | <input type="checkbox"/> upland erosion |
| <input type="checkbox"/> pollutant point source | <input type="checkbox"/> unvegetated upland area |

- 4. Lake/Pond/ Reservoir (reservoir name):** _____
- | | |
|--|---|
| <input type="checkbox"/> erosion | <input type="checkbox"/> lack of vegetation |
| <input type="checkbox"/> equine impact | <input type="checkbox"/> human impact (hiking/biking) |
| <input type="checkbox"/> safety hazard | <input type="checkbox"/> water quality (temperature, algae, geese, fecal) |

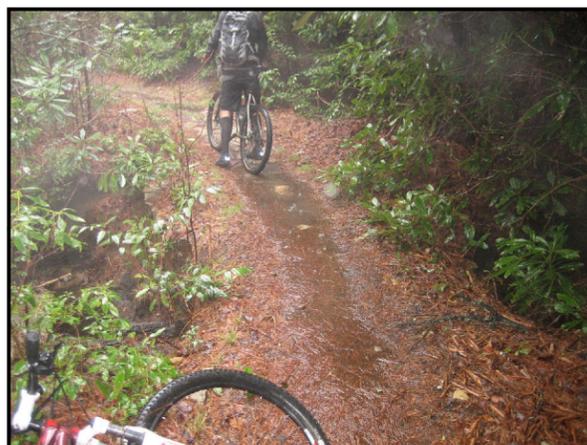
5. Other Problem Area(s) list contributing factors)

Potential Solutions

- | | |
|--|---|
| <input type="checkbox"/> relocate trail/close trail/road | <input checked="" type="checkbox"/> trail/road crossing improvement |
| <input type="checkbox"/> vegetation/ shoreline planting | <input type="checkbox"/> mechanical grading |
| <input type="checkbox"/> stormwater treatment | <input type="checkbox"/> animal watering |
| <input type="checkbox"/> human/ animal exclusion | <input checked="" type="checkbox"/> culvert rehabilitation/ replacement |
| <input type="checkbox"/> signs | <input type="checkbox"/> culvert daylighting |
| <input type="checkbox"/> maintenance | <input type="checkbox"/> bridge replacement/improvement |

Comments

Stream banks eroded upstream/ downstream of culvert. Trail currently intact.



Area of Concern – Site: P11

Map Grid Location: E10 Site visit date/ team): 4/13/15/ BK, JZ Drainage Area (Sq. Mi.): 16.7
 Name & Location: Corn Mill Shoals Trail at Little River Crossing



1. **Culvert (diameter/material/length):** _____

<input type="checkbox"/> clogged	<input type="checkbox"/> aquatic organism passage/ perched
<input type="checkbox"/> crushed	<input type="checkbox"/> erosion (upstream/ downstream)
<input type="checkbox"/> lack of natural bed	<input type="checkbox"/> piping
<input type="checkbox"/> safety hazard	<input type="checkbox"/> overtopping

2. **Trail/ Road Impact (trail/ road name):** Corn Mill Shoals Trail

<input type="checkbox"/> stormwater input	<input type="checkbox"/> sediment input
<input type="checkbox"/> bridge	<input type="checkbox"/> utilities
<input type="checkbox"/> unstable trail crossing	<input type="checkbox"/> erosion
<input checked="" type="checkbox"/> safety hazard	<input checked="" type="checkbox"/> human impact (hiking/biking)
<input checked="" type="checkbox"/> missing vegetation	<input checked="" type="checkbox"/> equine/ dog impacts

3. **Upland/ Stormwater**

<input type="checkbox"/> nonpoint source pollution	<input type="checkbox"/> upland erosion
<input type="checkbox"/> pollutant point source	<input type="checkbox"/> unvegetated upland area

4. **Lake/Pond/ Reservoir (reservoir name):** _____

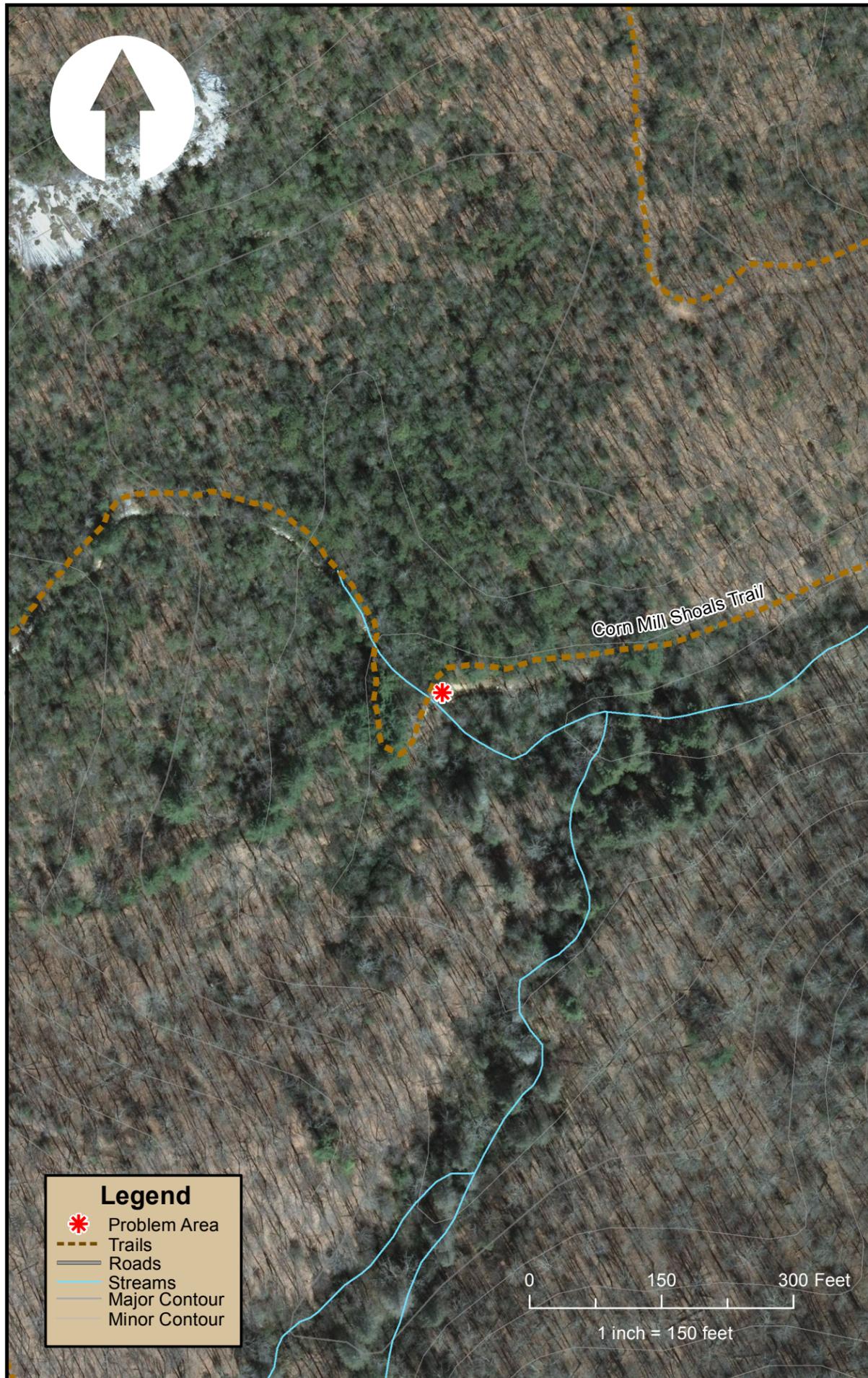
<input type="checkbox"/> erosion	<input type="checkbox"/> lack of vegetation
<input type="checkbox"/> equine impact	<input type="checkbox"/> human impact (hiking/biking)
<input type="checkbox"/> safety hazard	<input type="checkbox"/> water quality (temperature, algae, geese, fecal)

5. **Other Problem Area(s)** (list contributing factors)

- Potential Solutions**
- | | |
|---|---|
| <input checked="" type="checkbox"/> relocate trail/close trail/road | <input checked="" type="checkbox"/> trail/road crossing improvement |
| <input checked="" type="checkbox"/> vegetation/ shoreline planting | <input type="checkbox"/> mechanical grading |
| <input type="checkbox"/> stormwater treatment | <input type="checkbox"/> animal watering |
| <input checked="" type="checkbox"/> human/ animal exclusion | <input type="checkbox"/> culvert rehabilitation/ replacement |
| <input type="checkbox"/> signs | <input type="checkbox"/> culvert daylighting |
| <input type="checkbox"/> maintenance | <input type="checkbox"/> bridge replacement/improvement |

Comments
 Trail over widened and missing vegetation in vicinity of crossing. Actual crossing stable due to bedrock in riverbed.





Area of Concern – Site: P12

Map Grid Location: E10 Site visit date/ team): 4/13/15/ BK, JZ Drainage Area (Sq. Mi.): < 0.1
 Name & Location: Tributary at Corn Mill Shoals Trail

1. **Culvert (diameter/material/length):** 24" / CPP

<input type="checkbox"/> clogged	<input checked="" type="checkbox"/> aquatic organism passage/ perched
<input type="checkbox"/> crushed	<input type="checkbox"/> erosion (upstream/ downstream)
<input type="checkbox"/> lack of natural bed	<input type="checkbox"/> piping
<input type="checkbox"/> safety hazard	<input type="checkbox"/> overtopping
2. **Trail/ Road Impact (trail/ road name):** Corn Mill Shoals Trail

<input checked="" type="checkbox"/> stormwater input	<input checked="" type="checkbox"/> sediment input
<input type="checkbox"/> bridge	<input type="checkbox"/> utilities
<input type="checkbox"/> unstable trail crossing	<input type="checkbox"/> erosion
<input type="checkbox"/> safety hazard	<input type="checkbox"/> human impact (hiking/biking)
<input type="checkbox"/> missing vegetation	<input type="checkbox"/> equine/ dog impacts
3. **Upland/ Stormwater**

<input type="checkbox"/> nonpoint source pollution	<input type="checkbox"/> upland erosion
<input type="checkbox"/> pollutant point source	<input type="checkbox"/> unvegetated upland area
4. **Lake/Pond/ Reservoir (reservoir name):** _____

<input type="checkbox"/> erosion	<input type="checkbox"/> lack of vegetation
<input type="checkbox"/> equine impact	<input type="checkbox"/> human impact (hiking/biking)
<input type="checkbox"/> safety hazard	<input type="checkbox"/> water quality (temperature, algae, geese, fecal)
5. **Other Problem Area(s)** (list contributing factors)

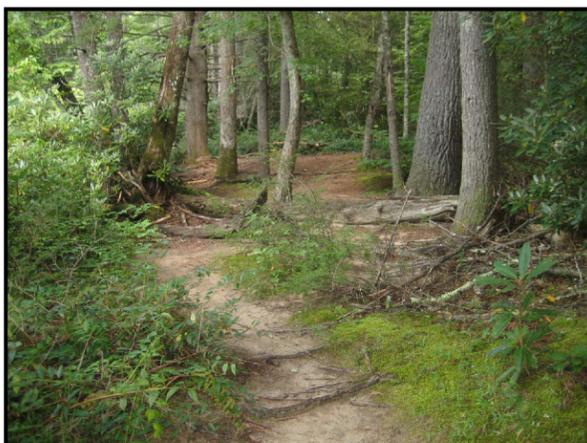
Potential Solutions

- | | |
|---|---|
| <input checked="" type="checkbox"/> relocate trail/close trail/road | <input checked="" type="checkbox"/> trail/road crossing improvement |
| <input type="checkbox"/> vegetation/ shoreline planting | <input type="checkbox"/> mechanical grading |
| <input type="checkbox"/> stormwater treatment | <input type="checkbox"/> animal watering |
| <input type="checkbox"/> human/ animal exclusion | <input type="checkbox"/> culvert rehabilitation/ replacement |
| <input type="checkbox"/> signs | <input type="checkbox"/> culvert daylighting |
| <input checked="" type="checkbox"/> maintenance | <input type="checkbox"/> bridge replacement/improvement |

Comments

Culvert appears to be in good condition, though perched at downstream end. Trail serves as sediment source to stream, with sediment traps full.





Area of Concern – Site: P13

Map Grid Location: E9 Site visit date/ team): 8/31/15/ JZ Drainage Area (Sq. Mi.): _____
 Name & Location: Bridal Veil Falls

1. **Culvert (diameter/material/length):** _____
 clogged aquatic organism passage/ perched
 crushed erosion (upstream/ downstream)
 lack of natural bed piping
 safety hazard overtopping
2. **Trail/ Road Impact (trail/ road name):** Bridal Veil Falls Road
 stormwater input sediment input
 bridge utilities
 unstable trail crossing erosion
 safety hazard human impact (hiking/biking)
 missing vegetation equine/ dog impacts
3. **Upland/ Stormwater**
 nonpoint source pollution upland erosion
 pollutant point source unvegetated upland area
4. **Lake/Pond/ Reservoir (reservoir name):** _____
 erosion lack of vegetation
 equine impact human impact (hiking/biking)
 safety hazard water quality (temperature, algae, geese, fecal)
5. **Other Problem Area(s)** (list contributing factors)

Potential Solutions

- | | |
|--|--|
| <input type="checkbox"/> relocate trail/close trail/road | <input type="checkbox"/> trail/road crossing improvement |
| <input checked="" type="checkbox"/> vegetation/ shoreline planting | <input type="checkbox"/> mechanical grading |
| <input type="checkbox"/> stormwater treatment | <input type="checkbox"/> animal watering |
| <input checked="" type="checkbox"/> human/ animal exclusion | <input type="checkbox"/> culvert rehabilitation/ replacement |
| <input checked="" type="checkbox"/> signs | <input type="checkbox"/> culvert daylighting |
| <input type="checkbox"/> maintenance | <input type="checkbox"/> bridge replacement/improvement |

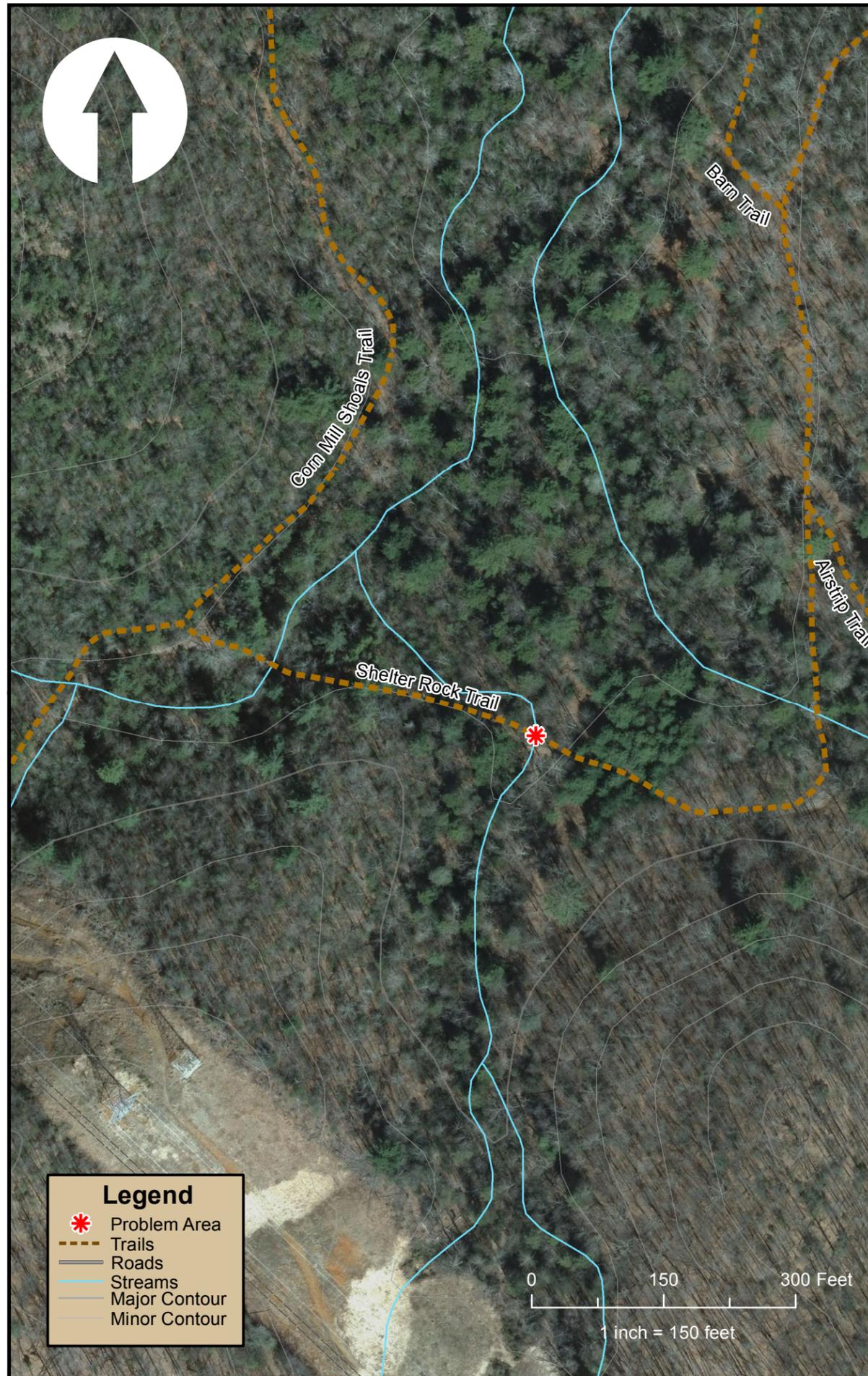
Comments

Human access to Bridal Veil Falls has resulted in bare areas and multiple small trails to access falls. Primary (gravel) road in good condition.



Area of Concern – Site: P14

Map Grid Location: F9 Site visit date/ team): 8/31/15/ JZ Drainage Area (Sq. Mi.): 0.1
 Name & Location: Tributary at Shelter Rock Trail



1. **Culvert (diameter/material/length):** _____

<input type="checkbox"/> clogged	<input type="checkbox"/> aquatic organism passage/ perched
<input type="checkbox"/> crushed	<input type="checkbox"/> erosion (upstream/ downstream)
<input type="checkbox"/> lack of natural bed	<input type="checkbox"/> piping
<input type="checkbox"/> safety hazard	<input type="checkbox"/> overtopping

2. **Trail/ Road Impact (trail/ road name):** Shelter Rock Trail

<input checked="" type="checkbox"/> stormwater input	<input type="checkbox"/> sediment input
<input type="checkbox"/> bridge	<input type="checkbox"/> utilities
<input type="checkbox"/> unstable trail crossing	<input type="checkbox"/> erosion
<input type="checkbox"/> safety hazard	<input checked="" type="checkbox"/> human impact (hiking/biking)
<input checked="" type="checkbox"/> missing vegetation	<input type="checkbox"/> equine/dog impacts

3. **Upland/ Stormwater**

<input type="checkbox"/> nonpoint source pollution	<input type="checkbox"/> upland erosion
<input type="checkbox"/> pollutant point source	<input type="checkbox"/> unvegetated upland area

4. **Lake/Pond/ Reservoir (reservoir name):** _____

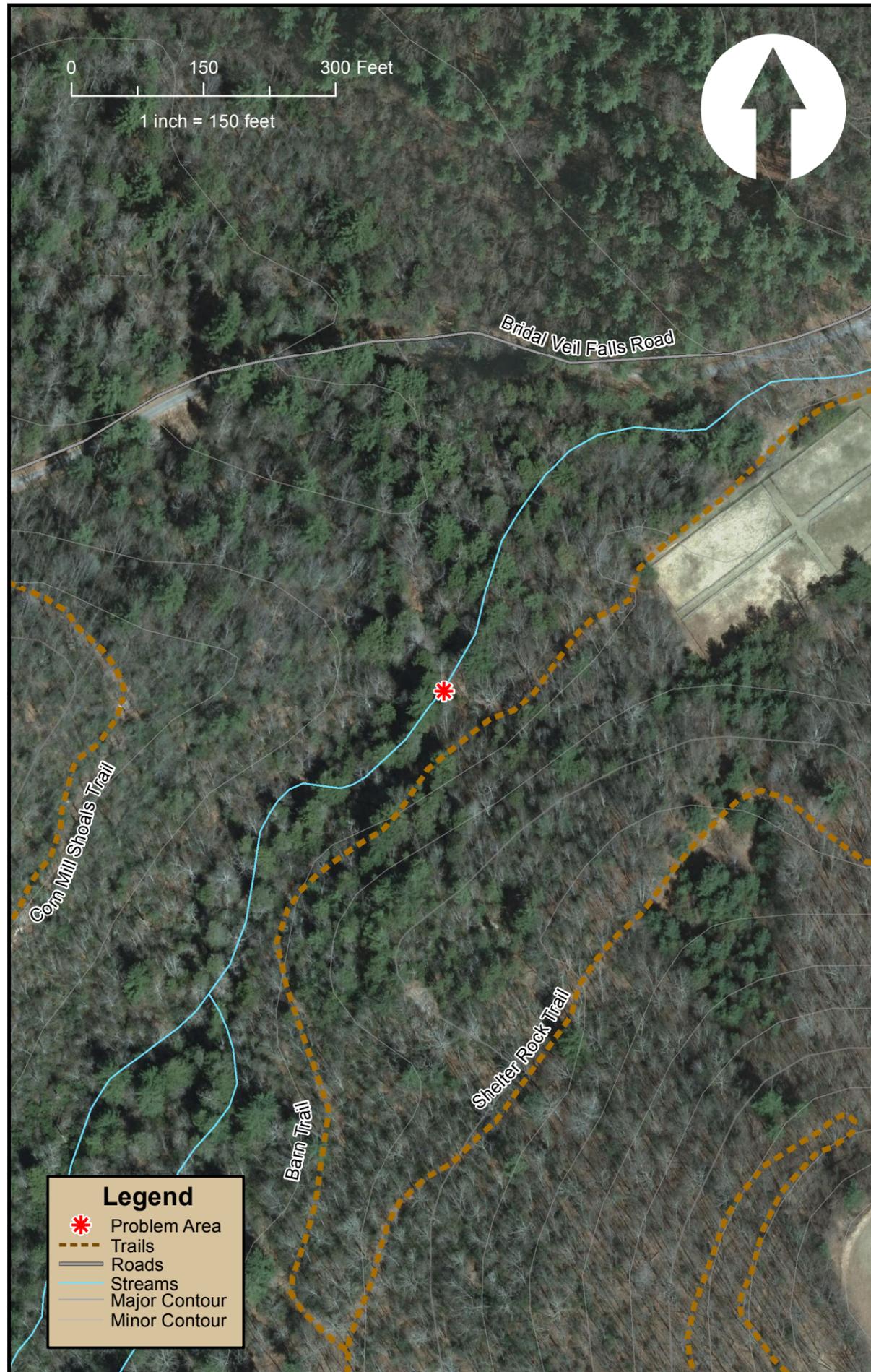
<input type="checkbox"/> erosion	<input type="checkbox"/> lack of vegetation
<input type="checkbox"/> equine impact	<input type="checkbox"/> human impact (hiking/biking)
<input type="checkbox"/> safety hazard	<input type="checkbox"/> water quality (temperature, algae, geese, fecal)

5. **Other Problem Area(s)** list contributing factors)

- Potential Solutions**
- | | |
|--|--|
| <input type="checkbox"/> relocate trail/close trail/road | <input type="checkbox"/> trail/road crossing improvement |
| <input checked="" type="checkbox"/> vegetation/ shoreline planting | <input type="checkbox"/> mechanical grading |
| <input type="checkbox"/> stormwater treatment | <input type="checkbox"/> animal watering |
| <input checked="" type="checkbox"/> human/ animal exclusion | <input type="checkbox"/> culvert rehabilitation/ replacement |
| <input type="checkbox"/> signs | <input type="checkbox"/> culvert daylighting |
| <input type="checkbox"/> maintenance | <input type="checkbox"/> bridge replacement/improvement |

Comments
 Culvert exists and appears to be in good condition. Bare area between trail and stream caused/ exacerbated by human access and stormwater.





Area of Concern – Site: P16

Map Grid Location: F9 Site visit date/ team): 8/31/15/ JZ Drainage Area (Sq. Mi.): 0.42
 Name & Location: Horse watering at Barn Trail

1. **Culvert (diameter/material/length):** _____
 clogged aquatic organism passage/ perched
 crushed erosion (upstream/ downstream)
 lack of natural bed piping
 safety hazard overtopping
2. **Trail/ Road Impact (trail/ road name):** Unnamed spur from Barn Trail
 stormwater input sediment input
 bridge utilities
 unstable trail crossing erosion
 safety hazard human impact (hiking/biking)
 missing vegetation equine/ dog impacts
3. **Upland/ Stormwater**
 nonpoint source pollution upland erosion
 pollutant point source unvegetated upland area
4. **Lake/Pond/ Reservoir (reservoir name):** _____
 erosion lack of vegetation
 equine impact human impact (hiking/biking)
 safety hazard water quality (temperature, algae, geese, fecal)
5. **Other Problem Area(s)** (list contributing factors)

Potential Solutions

- | | |
|---|--|
| <input checked="" type="checkbox"/> relocate trail/close trail/road | <input type="checkbox"/> trail/road crossing improvement |
| <input checked="" type="checkbox"/> vegetation/ shoreline planting | <input type="checkbox"/> mechanical grading |
| <input type="checkbox"/> stormwater treatment | <input checked="" type="checkbox"/> animal watering |
| <input checked="" type="checkbox"/> human/ animal exclusion | <input type="checkbox"/> culvert rehabilitation/ replacement |
| <input type="checkbox"/> signs | <input type="checkbox"/> culvert daylighting |
| <input type="checkbox"/> maintenance | <input type="checkbox"/> bridge replacement/improvement |

Comments

Unvegetated stream banks and fine sediment in stream at horse watering area.





Area of Concern – Site: P17

Map Grid Location: F9 Site visit date/ team): 8/31/15/ JZ Drainage Area (Sq. Mi.): < 0.1
 Name & Location: Airstrip Trail below airstrip

1. **Culvert (diameter/material/length):** _____

<input type="checkbox"/> clogged	<input type="checkbox"/> aquatic organism passage/ perched
<input type="checkbox"/> crushed	<input type="checkbox"/> erosion (upstream/ downstream)
<input type="checkbox"/> lack of natural bed	<input type="checkbox"/> piping
<input type="checkbox"/> safety hazard	<input type="checkbox"/> overtopping

2. **Trail/ Road Impact (trail/ road name):** _____

<input type="checkbox"/> stormwater input	<input type="checkbox"/> sediment input
<input type="checkbox"/> bridge	<input type="checkbox"/> utilities
<input type="checkbox"/> unstable trail crossing	<input type="checkbox"/> erosion
<input type="checkbox"/> safety hazard	<input type="checkbox"/> human impact (hiking/biking)
<input type="checkbox"/> missing vegetation	<input type="checkbox"/> equine/dog impacts

3. **Upland/ Stormwater**

<input checked="" type="checkbox"/> nonpoint source pollution	<input checked="" type="checkbox"/> upland erosion
<input type="checkbox"/> pollutant point source	<input checked="" type="checkbox"/> unvegetated upland area

4. **Lake/Pond/ Reservoir (reservoir name):** _____

<input type="checkbox"/> erosion	<input type="checkbox"/> lack of vegetation
<input type="checkbox"/> equine impact	<input type="checkbox"/> human impact (hiking/biking)
<input type="checkbox"/> safety hazard	<input type="checkbox"/> water quality (temperature, algae, geese, fecal)

5. **Other Problem Area(s)** (list contributing factors)
 Impervious surface (airstrip) contributing runoff.

Potential Solutions

- | | |
|--|---|
| <input type="checkbox"/> relocate trail/close trail/road | <input checked="" type="checkbox"/> trail/road crossing improvement |
| <input type="checkbox"/> vegetation/ shoreline planting | <input type="checkbox"/> mechanical grading |
| <input checked="" type="checkbox"/> stormwater treatment | <input type="checkbox"/> animal watering |
| <input type="checkbox"/> human/ animal exclusion | <input type="checkbox"/> culvert rehabilitation/ replacement |
| <input type="checkbox"/> signs | <input type="checkbox"/> culvert daylighting |
| <input type="checkbox"/> maintenance | <input type="checkbox"/> bridge replacement/improvement |

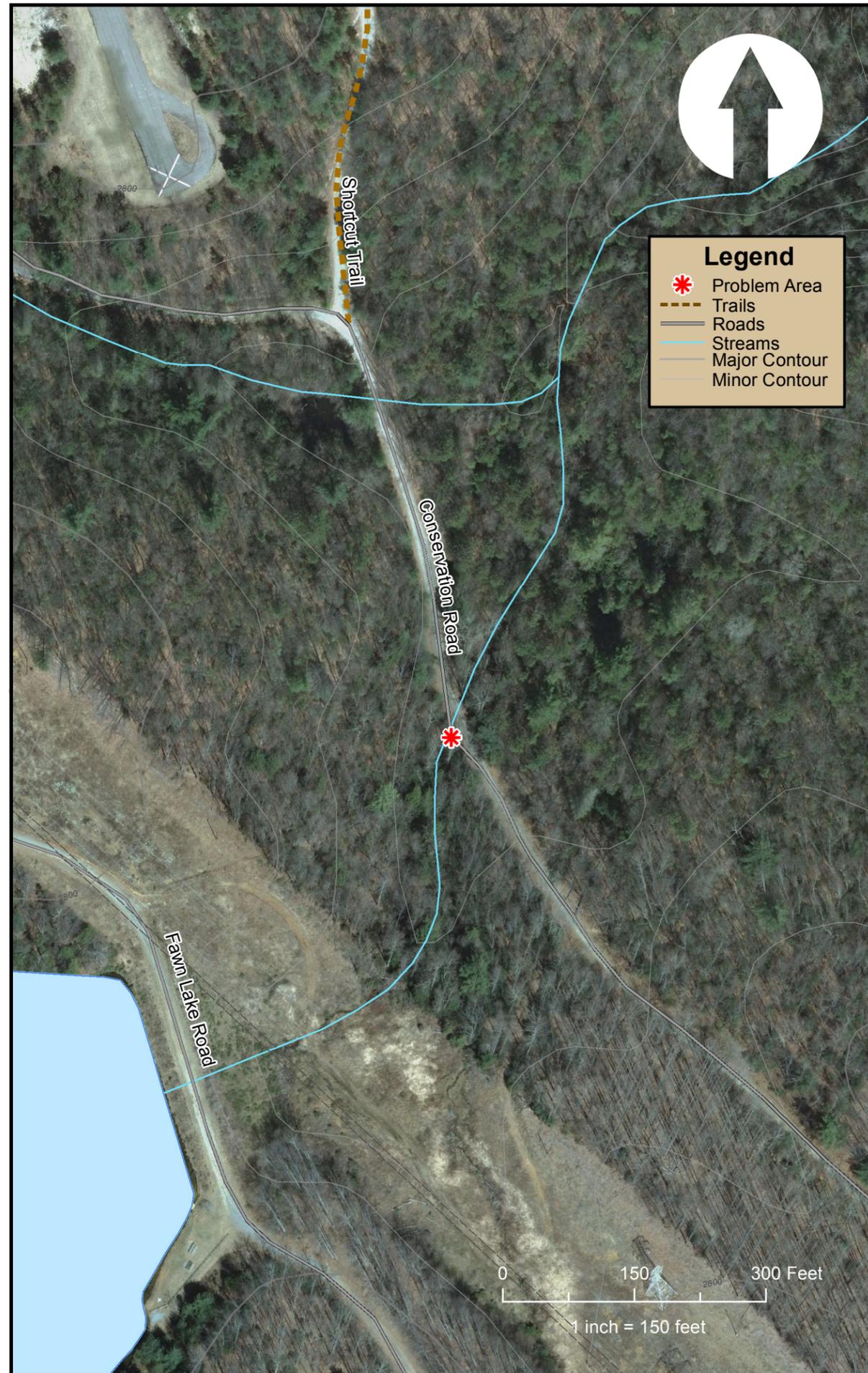
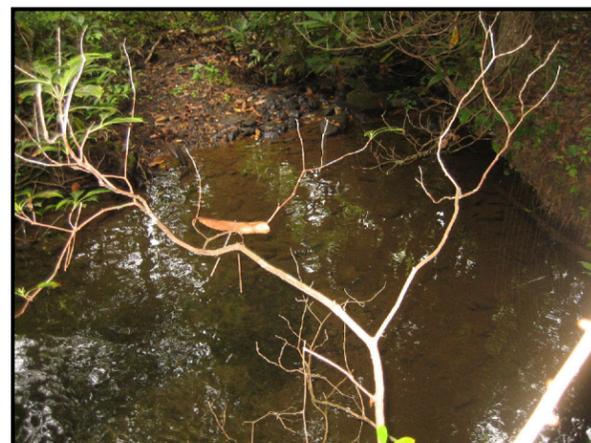
Comments

Airstrip Trail is in good condition. However, runoff from impervious airstrip has formed gully crossing Airstrip Trail in multiple locations. Potential solution includes treating stormwater at its source.



Area of Concern – Site: P18

Map Grid Location: F10 Site visit date/ team): 8/17/15/ JZ Drainage Area (Sq. Mi.): 0.15
 Name & Location: Fawn Lake outlet at Conservation Road



Legend

- * Problem Area
- Trails
- Roads
- Streams
- Major Contour
- Minor Contour

1. **Culvert (diameter/material/length):** 15"/ RCP

<input type="checkbox"/> clogged	<input type="checkbox"/> aquatic organism passage/ perched
<input type="checkbox"/> crushed	<input checked="" type="checkbox"/> erosion (upstream/ downstream)
<input type="checkbox"/> lack of natural bed	<input checked="" type="checkbox"/> piping
<input type="checkbox"/> safety hazard	<input type="checkbox"/> overtopping

2. **Trail/ Road Impact (trail/ road name):** Conservation Road

<input checked="" type="checkbox"/> stormwater input	<input checked="" type="checkbox"/> sediment input
<input type="checkbox"/> bridge	<input type="checkbox"/> utilities
<input type="checkbox"/> unstable trail crossing	<input type="checkbox"/> erosion
<input type="checkbox"/> safety hazard	<input type="checkbox"/> human impact (hiking/biking)
<input type="checkbox"/> missing vegetation	<input type="checkbox"/> equine/ dog impacts

3. **Upland/ Stormwater**

<input type="checkbox"/> nonpoint source pollution	<input type="checkbox"/> upland erosion
<input type="checkbox"/> pollutant point source	<input type="checkbox"/> unvegetated upland area

4. **Lake/Pond/ Reservoir (reservoir name):** _____

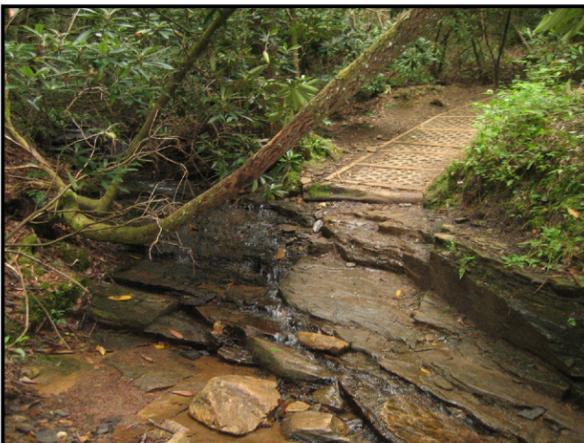
<input type="checkbox"/> erosion	<input type="checkbox"/> lack of vegetation
<input type="checkbox"/> equine impact	<input type="checkbox"/> human impact (hiking/biking)
<input type="checkbox"/> safety hazard	<input type="checkbox"/> water quality (temperature, algae, geese, fecal)

5. **Other Problem Area(s)** (list contributing factors)

- Potential Solutions**
- | | |
|--|---|
| <input type="checkbox"/> relocate trail/close trail/road | <input type="checkbox"/> trail/road crossing improvement |
| <input type="checkbox"/> vegetation/ shoreline planting | <input type="checkbox"/> mechanical grading |
| <input type="checkbox"/> stormwater treatment | <input type="checkbox"/> animal watering |
| <input type="checkbox"/> human/ animal exclusion | <input checked="" type="checkbox"/> culvert rehabilitation/ replacement |
| <input type="checkbox"/> signs | <input type="checkbox"/> culvert daylighting |
| <input type="checkbox"/> maintenance | <input type="checkbox"/> bridge replacement/improvement |

Comments
 Very minor bank erosion and deposition upstream and downstream of culvert, possible piping, minor erosion around culvert at downstream end.





Area of Concern – Site: P19

Map Grid Location: G11 Site visit date/ team): 8/17/15/ JZ Drainage Area (Sq. Mi.): 2.58
 Name & Location: Reasonover Creek at Reasonover Creek Trail

1. **Culvert (diameter/material/length):** _____
 clogged aquatic organism passage/ perched
 crushed erosion (upstream/ downstream)
 lack of natural bed piping
 safety hazard overtopping
2. **Trail/ Road Impact (trail/ road name):** Reasonover Creek Trail
 stormwater input sediment input
 bridge utilities
 unstable trail crossing erosion
 safety hazard human impact (hiking/biking)
 missing vegetation equine/dog impacts
3. **Upland/ Stormwater**
 nonpoint source pollution upland erosion
 pollutant point source unvegetated upland area
4. **Lake/Pond/ Reservoir (reservoir name):** _____
 erosion lack of vegetation
 equine impact human impact (hiking/biking)
 safety hazard water quality (temperature, algae, geese, fecal)
5. **Other Problem Area(s)** (list contributing factors)

- Potential Solutions**
- | | |
|--|---|
| <input type="checkbox"/> relocate trail/close trail/road | <input checked="" type="checkbox"/> trail/road crossing improvement |
| <input checked="" type="checkbox"/> vegetation/ shoreline planting | <input type="checkbox"/> mechanical grading |
| <input type="checkbox"/> stormwater treatment | <input type="checkbox"/> animal watering |
| <input type="checkbox"/> human/ animal exclusion | <input type="checkbox"/> culvert rehabilitation/ replacement |
| <input type="checkbox"/> signs | <input type="checkbox"/> culvert daylighting |
| <input type="checkbox"/> maintenance | <input type="checkbox"/> bridge replacement/improvement |

Comments
 Trail crosses at confluence with tributary; hardened trail each side of Reasonover Creek. Left bank: very minor bank erosion and erosion along trail. Right bank: unvegetated area.





Area of Concern – Site: P20

Map Grid Location: F9 Site visit date/ team): 8/19/15/ JZ Drainage Area (Sq. Mi.): < 0.1
 Name & Location: Drainage across Reasonover Creek Trail

1. **Culvert (diameter/material/length):** _____
 clogged aquatic organism passage/ perched
 crushed erosion (upstream/ downstream)
 lack of natural bed piping
 safety hazard overtopping
2. **Trail/ Road Impact (trail/ road name):** Reasonover Creek Trail
 stormwater input sediment input
 bridge utilities
 unstable trail crossing erosion
 safety hazard human impact (hiking/biking)
 missing vegetation equine/dog impacts
3. **Upland/ Stormwater**
 nonpoint source pollution upland erosion
 pollutant point source unvegetated upland area
4. **Lake/Pond/ Reservoir (reservoir name):** _____
 erosion lack of vegetation
 equine impact human impact (hiking/biking)
 safety hazard water quality (temperature, algae, geese, fecal)
5. **Other Problem Area(s)** list contributing factors)

Potential Solutions

- | | |
|--|---|
| <input type="checkbox"/> relocate trail/close trail/road | <input checked="" type="checkbox"/> trail/road crossing improvement |
| <input checked="" type="checkbox"/> vegetation/ shoreline planting | <input type="checkbox"/> mechanical grading |
| <input type="checkbox"/> stormwater treatment | <input type="checkbox"/> animal watering |
| <input type="checkbox"/> human/ animal exclusion | <input type="checkbox"/> culvert rehabilitation/ replacement |
| <input type="checkbox"/> signs | <input type="checkbox"/> culvert daylighting |
| <input type="checkbox"/> maintenance | <input type="checkbox"/> bridge replacement/improvement |

Comments

Stormwater drainage flows across trail; erosion and sediment deposition in vicinity. Potentially install small ford or culvert.

Area of Concern – Site: P21

Map Grid Location: F10 Site visit date/ team): 8/19/15/ JZ Drainage Area (Sq. Mi.): 3.27
 Name & Location: Reasonover Creek at Reasonover Creek Trail



- 1. Culvert (diameter/material/length):** _____
- | | |
|--|--|
| <input type="checkbox"/> clogged | <input type="checkbox"/> aquatic organism passage/ perched |
| <input type="checkbox"/> crushed | <input type="checkbox"/> erosion (upstream/ downstream) |
| <input type="checkbox"/> lack of natural bed | <input type="checkbox"/> piping |
| <input type="checkbox"/> safety hazard | <input type="checkbox"/> overtopping |

- 2. Trail/ Road Impact (trail/ road name):** Reasonover Creek Trail
- | | |
|---|--|
| <input type="checkbox"/> stormwater input | <input checked="" type="checkbox"/> sediment input |
| <input type="checkbox"/> bridge | <input type="checkbox"/> utilities |
| <input checked="" type="checkbox"/> unstable trail crossing | <input type="checkbox"/> erosion |
| <input type="checkbox"/> safety hazard | <input checked="" type="checkbox"/> human impact (hiking/biking) |
| <input type="checkbox"/> missing vegetation | <input checked="" type="checkbox"/> equine/dog impacts |

- 3. Upland/ Stormwater**
- | | |
|--|--|
| <input type="checkbox"/> nonpoint source pollution | <input type="checkbox"/> upland erosion |
| <input type="checkbox"/> pollutant point source | <input type="checkbox"/> unvegetated upland area |

- 4. Lake/Pond/ Reservoir (reservoir name):** _____
- | | |
|--|---|
| <input type="checkbox"/> erosion | <input type="checkbox"/> lack of vegetation |
| <input type="checkbox"/> equine impact | <input type="checkbox"/> human impact (hiking/biking) |
| <input type="checkbox"/> safety hazard | <input type="checkbox"/> water quality (temperature, algae, geese, fecal) |

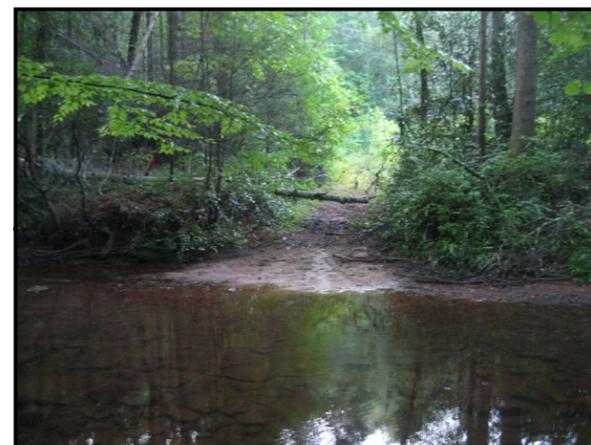
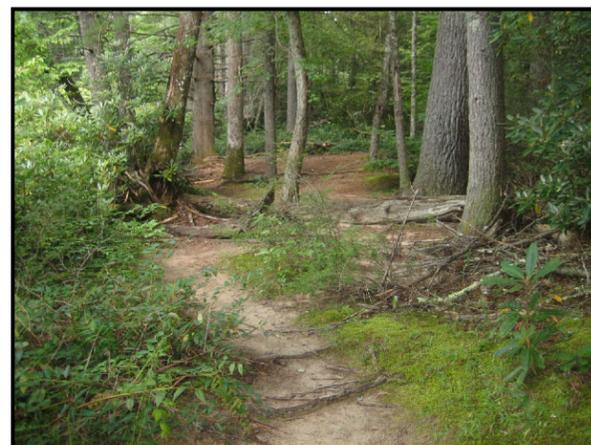
5. Other Problem Area(s) (list contributing factors)

Potential Solutions

- | | |
|--|---|
| <input type="checkbox"/> relocate trail/close trail/road | <input checked="" type="checkbox"/> trail/road crossing improvement |
| <input checked="" type="checkbox"/> vegetation/ shoreline planting | <input type="checkbox"/> mechanical grading |
| <input type="checkbox"/> stormwater treatment | <input type="checkbox"/> animal watering |
| <input checked="" type="checkbox"/> human/ animal exclusion | <input type="checkbox"/> culvert rehabilitation/ replacement |
| <input type="checkbox"/> signs | <input type="checkbox"/> culvert daylighting |
| <input type="checkbox"/> maintenance | <input type="checkbox"/> bridge replacement/improvement |

Comments

Fine sediment entering creek as result of trail crossing. Potentially improve to harden crossing.



Area of Concern – Site: P22

Map Grid Location: F10 Site visit date/ team): 8/19/15/ JZ Drainage Area (Sq. Mi.): < 0.1
 Name & Location: Tributary at Reasonover Creek Trail



1. Culvert (diameter/material/length): _____

- | | |
|--|--|
| <input type="checkbox"/> clogged | <input type="checkbox"/> aquatic organism passage/ perched |
| <input type="checkbox"/> crushed | <input type="checkbox"/> erosion (upstream/ downstream) |
| <input type="checkbox"/> lack of natural bed | <input type="checkbox"/> piping |
| <input type="checkbox"/> safety hazard | <input type="checkbox"/> overtopping |

2. Trail/ Road Impact (trail/ road name): Reasonover Creek Trail

- | | |
|---|--|
| <input type="checkbox"/> stormwater input | <input type="checkbox"/> sediment input |
| <input type="checkbox"/> bridge | <input type="checkbox"/> utilities |
| <input checked="" type="checkbox"/> unstable trail crossing | <input type="checkbox"/> erosion |
| <input type="checkbox"/> safety hazard | <input checked="" type="checkbox"/> human impact (hiking/biking) |
| <input checked="" type="checkbox"/> missing vegetation | <input type="checkbox"/> equine/dog impacts |

3. Upland/ Stormwater

- | | |
|--|--|
| <input type="checkbox"/> nonpoint source pollution | <input type="checkbox"/> upland erosion |
| <input type="checkbox"/> pollutant point source | <input type="checkbox"/> unvegetated upland area |

4. Lake/Pond/ Reservoir (reservoir name): _____

- | | |
|--|---|
| <input type="checkbox"/> erosion | <input type="checkbox"/> lack of vegetation |
| <input type="checkbox"/> equine impact | <input type="checkbox"/> human impact (hiking/biking) |
| <input type="checkbox"/> safety hazard | <input type="checkbox"/> water quality (temperature, algae, geese, fecal) |

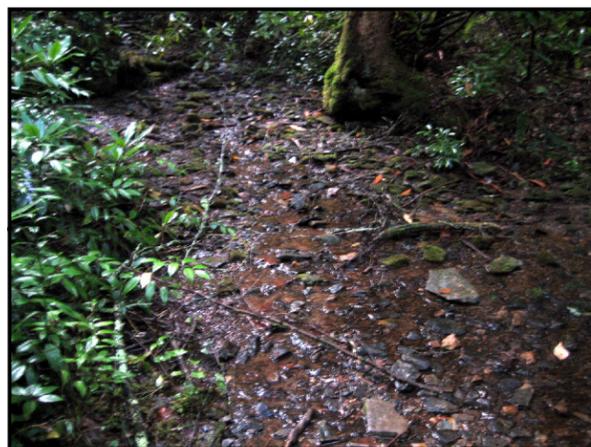
5. Other Problem Area(s) (list contributing factors)

Potential Solutions

- | | |
|--|---|
| <input type="checkbox"/> relocate trail/close trail/road | <input checked="" type="checkbox"/> trail/road crossing improvement |
| <input checked="" type="checkbox"/> vegetation/ shoreline planting | <input type="checkbox"/> mechanical grading |
| <input type="checkbox"/> stormwater treatment | <input type="checkbox"/> animal watering |
| <input type="checkbox"/> human/ animal exclusion | <input type="checkbox"/> culvert rehabilitation/ replacement |
| <input type="checkbox"/> signs | <input type="checkbox"/> culvert daylighting |
| <input type="checkbox"/> maintenance | <input type="checkbox"/> bridge replacement/improvement |

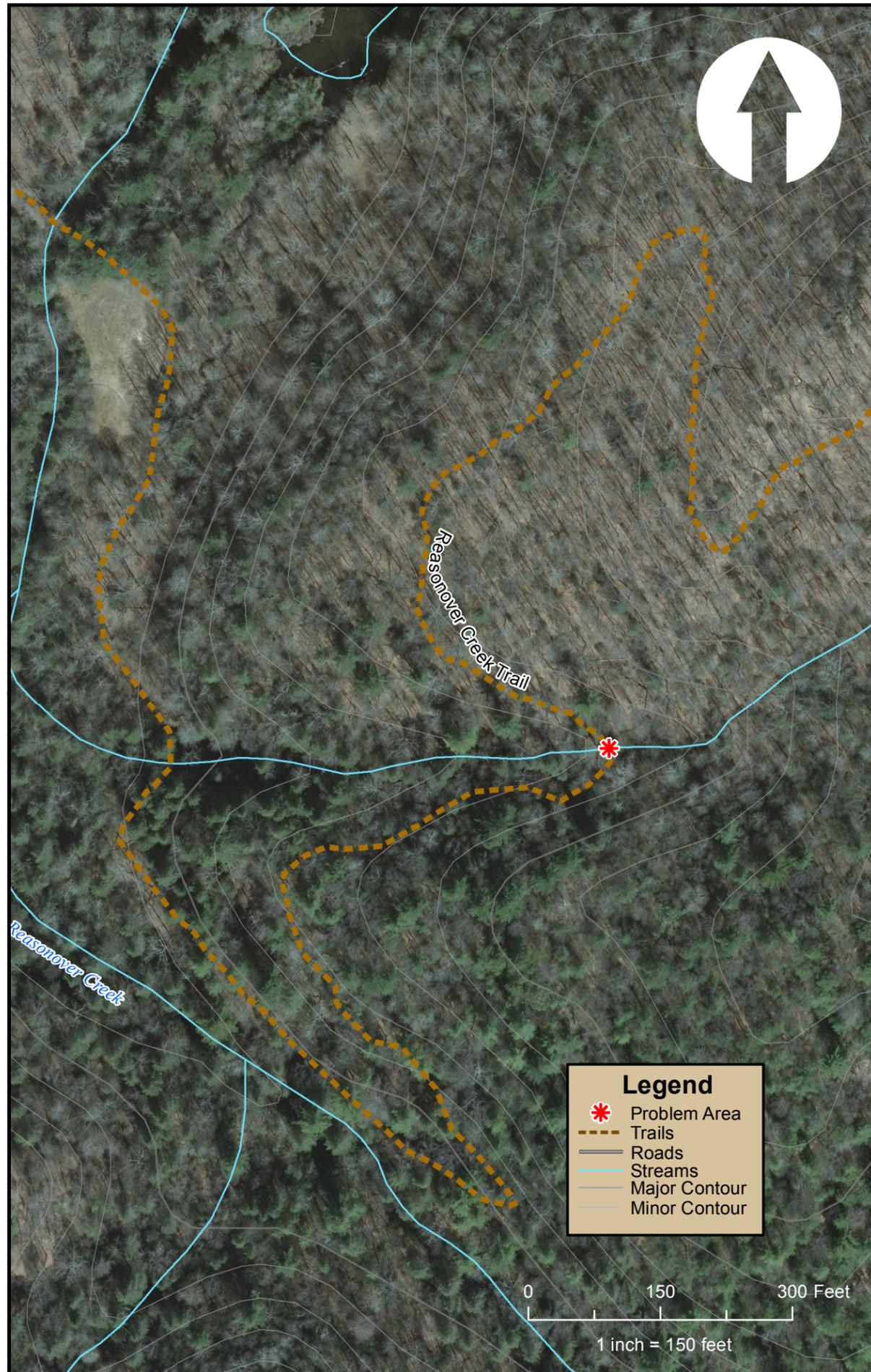
Comments

Tributary over widened and unvegetated at trail crossing.



Area of Concern – Site: P23

Map Grid Location: F10 Site visit date/ team): 8/19/15/ JZ Drainage Area (Sq. Mi.): < 0.1
 Name & Location: Tributary at Reasonover Creek Trail



- 1. Culvert (diameter/material/length):** 12"/ CPP
- | | |
|--|--|
| <input checked="" type="checkbox"/> clogged | <input type="checkbox"/> aquatic organism passage/ perched |
| <input type="checkbox"/> crushed | <input type="checkbox"/> erosion (upstream/ downstream) |
| <input type="checkbox"/> lack of natural bed | <input type="checkbox"/> piping |
| <input type="checkbox"/> safety hazard | <input type="checkbox"/> overtopping |

- 2. Trail/ Road Impact (trail/ road name):** _____
- | | |
|--|---|
| <input type="checkbox"/> stormwater input | <input type="checkbox"/> sediment input |
| <input type="checkbox"/> bridge | <input type="checkbox"/> utilities |
| <input type="checkbox"/> unstable trail crossing | <input type="checkbox"/> erosion |
| <input type="checkbox"/> safety hazard | <input type="checkbox"/> human impact (hiking/biking) |
| <input type="checkbox"/> missing vegetation | <input type="checkbox"/> equine/dog impacts |

- 3. Upland/ Stormwater**
- | | |
|--|--|
| <input type="checkbox"/> nonpoint source pollution | <input type="checkbox"/> upland erosion |
| <input type="checkbox"/> pollutant point source | <input type="checkbox"/> unvegetated upland area |

- 4. Lake/Pond/ Reservoir (reservoir name):** _____
- | | |
|--|---|
| <input type="checkbox"/> erosion | <input type="checkbox"/> lack of vegetation |
| <input type="checkbox"/> equine impact | <input type="checkbox"/> human impact (hiking/biking) |
| <input type="checkbox"/> safety hazard | <input type="checkbox"/> water quality (temperature, algae, geese, fecal) |

5. Other Problem Area(s) list contributing factors)

Potential Solutions

- | | |
|--|---|
| <input type="checkbox"/> relocate trail/close trail/road | <input type="checkbox"/> trail/road crossing improvement |
| <input type="checkbox"/> vegetation/ shoreline planting | <input type="checkbox"/> mechanical grading |
| <input type="checkbox"/> stormwater treatment | <input type="checkbox"/> animal watering |
| <input type="checkbox"/> human/ animal exclusion | <input checked="" type="checkbox"/> culvert rehabilitation/ replacement |
| <input type="checkbox"/> signs | <input type="checkbox"/> culvert daylighting |
| <input checked="" type="checkbox"/> maintenance | <input type="checkbox"/> bridge replacement/improvement |

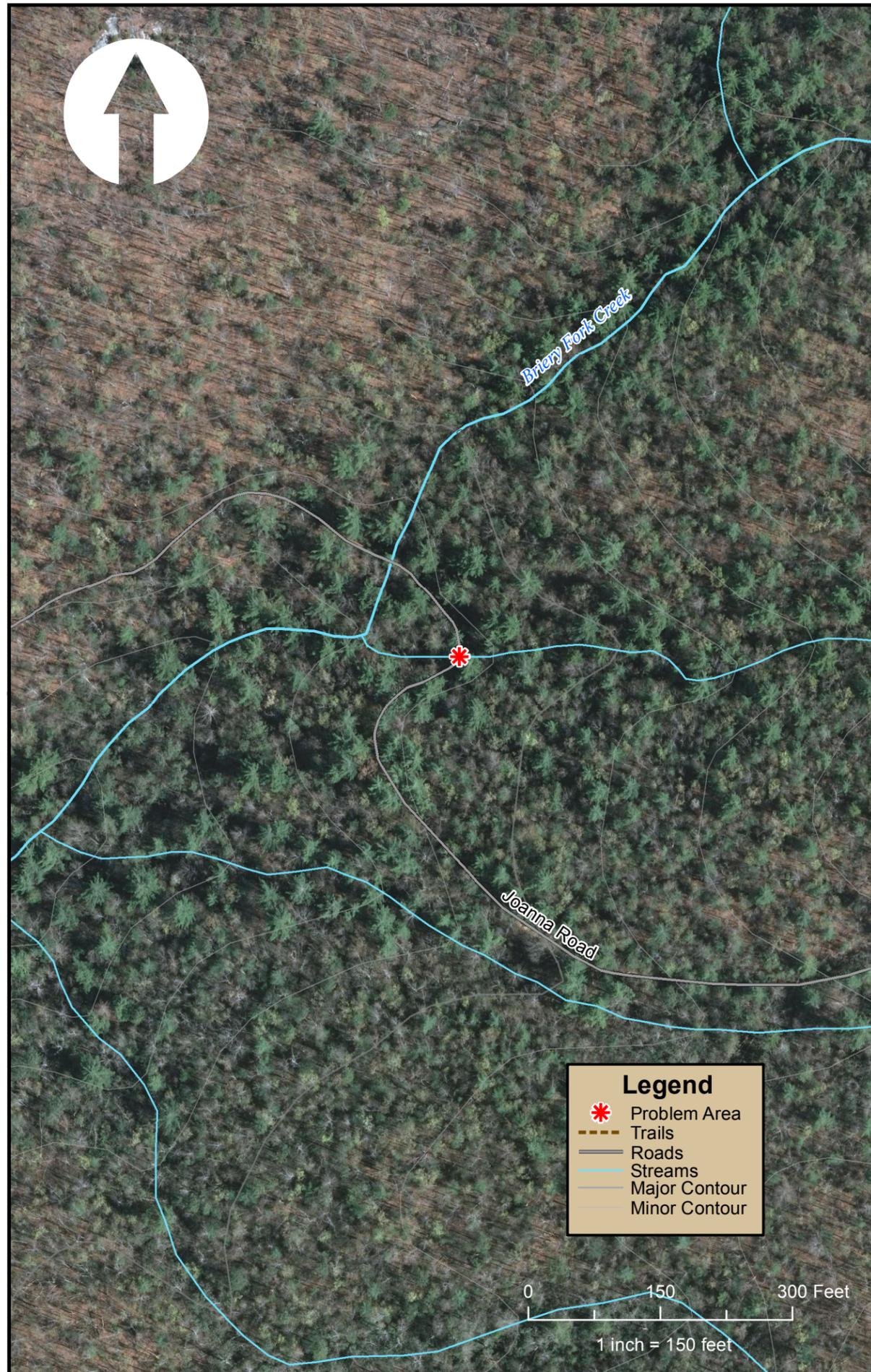
Comments

Culvert appears to be clogged. Trail currently stable, but potential exists for overtopping.



Area of Concern – Site: P25

Map Grid Location: J8 Site visit date/ team): 8/30/15/ JZ Drainage Area (Sq. Mi.): < 0.1
 Name & Location: Tributary to Briery Fork Creek at Joanna Road



1. **Culvert (diameter/material/length):** _____

<input type="checkbox"/> clogged	<input type="checkbox"/> aquatic organism passage/ perched
<input type="checkbox"/> crushed	<input type="checkbox"/> erosion (upstream/ downstream)
<input type="checkbox"/> lack of natural bed	<input type="checkbox"/> piping
<input type="checkbox"/> safety hazard	<input type="checkbox"/> overtopping

2. **Trail/ Road Impact (trail/ road name):** Joanna Road

<input checked="" type="checkbox"/> stormwater input	<input checked="" type="checkbox"/> sediment input
<input type="checkbox"/> bridge	<input type="checkbox"/> utilities
<input checked="" type="checkbox"/> unstable trail crossing	<input type="checkbox"/> erosion
<input type="checkbox"/> safety hazard	<input checked="" type="checkbox"/> human impact (hiking/biking)
<input type="checkbox"/> missing vegetation	<input type="checkbox"/> equine/dog impacts

3. **Upland/ Stormwater**

<input type="checkbox"/> nonpoint source pollution	<input type="checkbox"/> upland erosion
<input type="checkbox"/> pollutant point source	<input type="checkbox"/> unvegetated upland area

4. **Lake/Pond/ Reservoir (reservoir name):** _____

<input type="checkbox"/> erosion	<input type="checkbox"/> lack of vegetation
<input type="checkbox"/> equine impact	<input type="checkbox"/> human impact (hiking/biking)
<input type="checkbox"/> safety hazard	<input type="checkbox"/> water quality (temperature, algae, geese, fecal)

5. **Other Problem Area(s)** (list contributing factors)

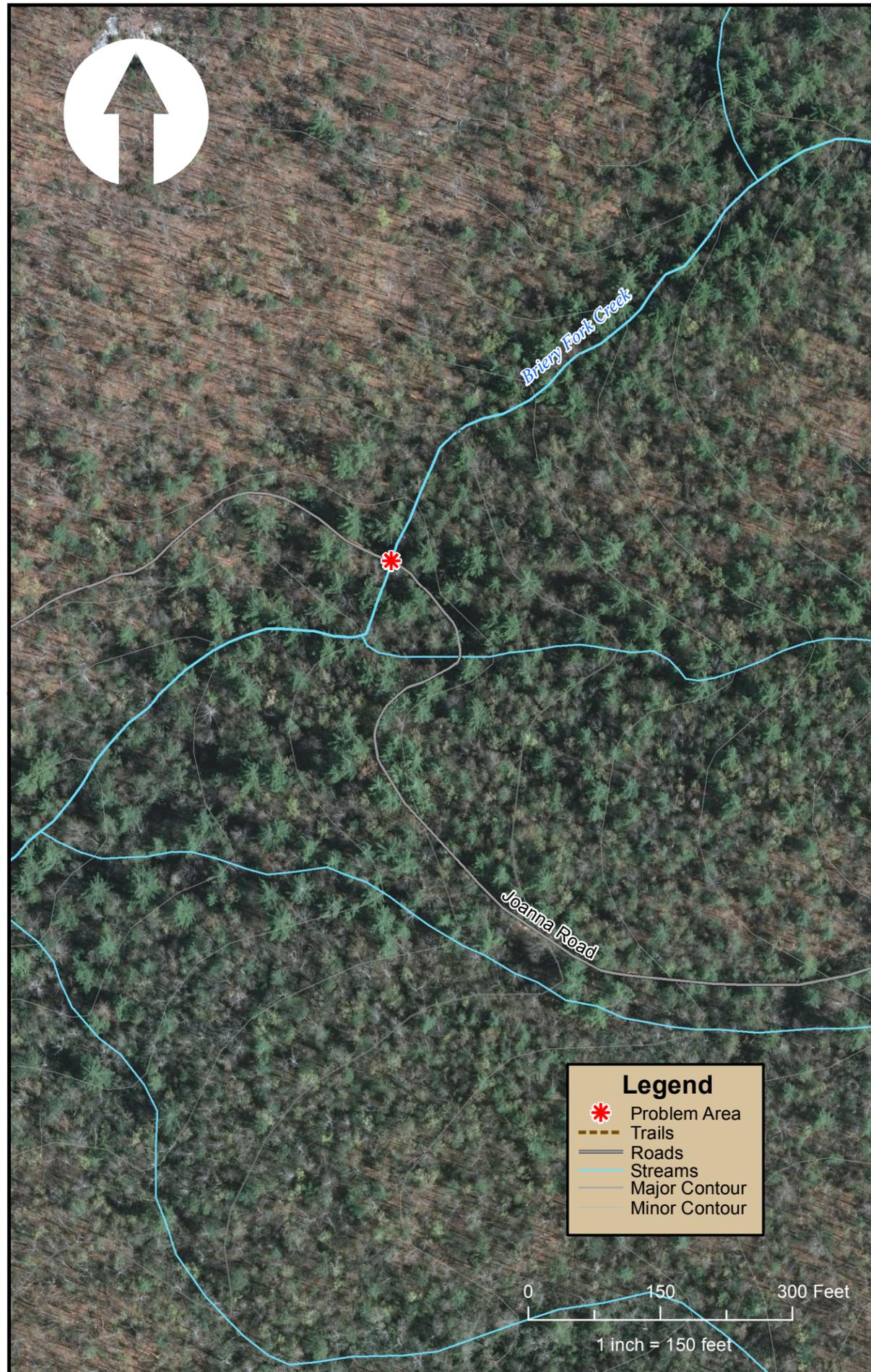
- Potential Solutions**
- | | |
|---|---|
| <input checked="" type="checkbox"/> relocate trail/close trail/road | <input checked="" type="checkbox"/> trail/road crossing improvement |
| <input type="checkbox"/> vegetation/ shoreline planting | <input type="checkbox"/> mechanical grading |
| <input type="checkbox"/> stormwater treatment | <input type="checkbox"/> animal watering |
| <input type="checkbox"/> human/ animal exclusion | <input type="checkbox"/> culvert rehabilitation/ replacement |
| <input type="checkbox"/> signs | <input type="checkbox"/> culvert daylighting |
| <input type="checkbox"/> maintenance | <input type="checkbox"/> bridge replacement/improvement |

Comments
 Trail crossing serves as source of fine sediment. Potentially install bridge/ culvert or sediment traps/ diversions on trail.



Area of Concern – Site: P26

Map Grid Location: J8 Site visit date/ team): 8/30/15/ JZ Drainage Area (Sq. Mi.): < 0.1
 Name & Location: Tributary to Briery Fork Creek at Joanna Road



1. **Culvert (diameter/material/length):** _____

<input type="checkbox"/> clogged	<input type="checkbox"/> aquatic organism passage/ perched
<input type="checkbox"/> crushed	<input type="checkbox"/> erosion (upstream/ downstream)
<input type="checkbox"/> lack of natural bed	<input type="checkbox"/> piping
<input type="checkbox"/> safety hazard	<input type="checkbox"/> overtopping

2. **Trail/ Road Impact (trail/ road name):** Joanna Road

<input checked="" type="checkbox"/> stormwater input	<input checked="" type="checkbox"/> sediment input
<input type="checkbox"/> bridge	<input type="checkbox"/> utilities
<input checked="" type="checkbox"/> unstable trail crossing	<input type="checkbox"/> erosion
<input type="checkbox"/> safety hazard	<input checked="" type="checkbox"/> human impact (hiking/biking)
<input type="checkbox"/> missing vegetation	<input type="checkbox"/> equine/dog impacts

3. **Upland/ Stormwater**

<input type="checkbox"/> nonpoint source pollution	<input type="checkbox"/> upland erosion
<input type="checkbox"/> pollutant point source	<input type="checkbox"/> unvegetated upland area

4. **Lake/Pond/ Reservoir (reservoir name):** _____

<input type="checkbox"/> erosion	<input type="checkbox"/> lack of vegetation
<input type="checkbox"/> equine impact	<input type="checkbox"/> human impact (hiking/biking)
<input type="checkbox"/> safety hazard	<input type="checkbox"/> water quality (temperature, algae, geese, fecal)

5. **Other Problem Area(s)** (list contributing factors)

- Potential Solutions**
- | | |
|---|---|
| <input checked="" type="checkbox"/> relocate trail/close trail/road | <input checked="" type="checkbox"/> trail/road crossing improvement |
| <input type="checkbox"/> vegetation/ shoreline planting | <input type="checkbox"/> mechanical grading |
| <input type="checkbox"/> stormwater treatment | <input type="checkbox"/> animal watering |
| <input type="checkbox"/> human/ animal exclusion | <input type="checkbox"/> culvert rehabilitation/ replacement |
| <input type="checkbox"/> signs | <input type="checkbox"/> culvert daylighting |
| <input type="checkbox"/> maintenance | <input type="checkbox"/> bridge replacement/improvement |

Comments
 Trail crossing serves as source of fine sediment. Potentially install bridge/ culvert or sediment traps/ diversions on trail.



Area of Concern – Site: P27

Map Grid Location: I7 Site visit date/ team): 8/30/15/ JZ Drainage Area (Sq. Mi.): 0.42
 Name & Location: Tributary at Grassy Meadow Trail



1. **Culvert (diameter/material/length):** _____
 clogged aquatic organism passage/ perched
 crushed erosion (upstream/ downstream)
 lack of natural bed piping
 safety hazard overtopping
2. **Trail/ Road Impact (trail/ road name):** Grassy Meadow Trail
 stormwater input sediment input
 bridge utilities
 unstable trail crossing erosion
 safety hazard human impact (hiking/biking)
 missing vegetation equine/ dog impacts
3. **Upland/ Stormwater**
 nonpoint source pollution upland erosion
 pollutant point source unvegetated upland area
4. **Lake/Pond/ Reservoir (reservoir name):** _____
 erosion lack of vegetation
 equine impact human impact (hiking/biking)
 safety hazard water quality (temperature, algae, geese, fecal)
5. **Other Problem Area(s)** (list contributing factors)

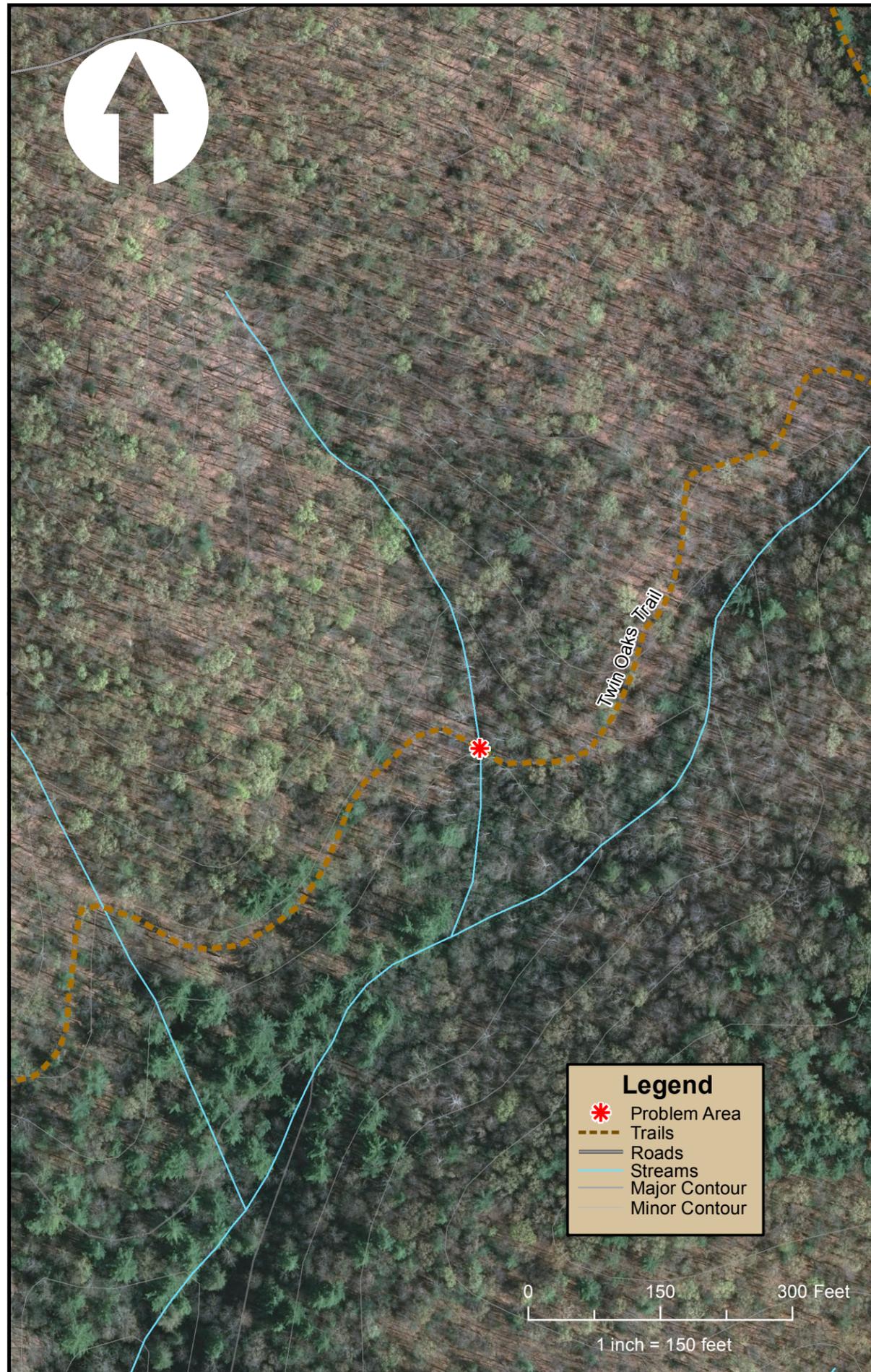
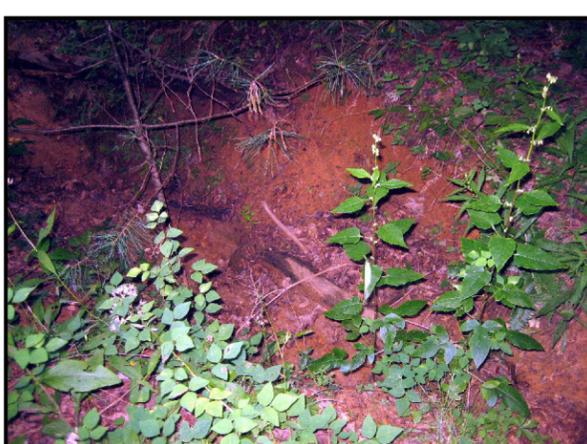
- Potential Solutions**
- | | |
|--|---|
| <input type="checkbox"/> relocate trail/close trail/road | <input checked="" type="checkbox"/> trail/road crossing improvement |
| <input type="checkbox"/> vegetation/ shoreline planting | <input type="checkbox"/> mechanical grading |
| <input type="checkbox"/> stormwater treatment | <input type="checkbox"/> animal watering |
| <input type="checkbox"/> human/ animal exclusion | <input type="checkbox"/> culvert rehabilitation/ replacement |
| <input type="checkbox"/> signs | <input type="checkbox"/> culvert daylighting |
| <input type="checkbox"/> maintenance | <input type="checkbox"/> bridge replacement/improvement |

Comments
 Trail crossing serves as source of fine sediment, though crossing itself is stable on bedrock. Potentially install sediment traps/ diversions on trail.



Area of Concern – Site: P29

Map Grid Location: H8 Site visit date/ team): 8/30/15/ JZ Drainage Area (Sq. Mi.): < 0.1
 Name & Location: Tributary at Twin Oaks Trail

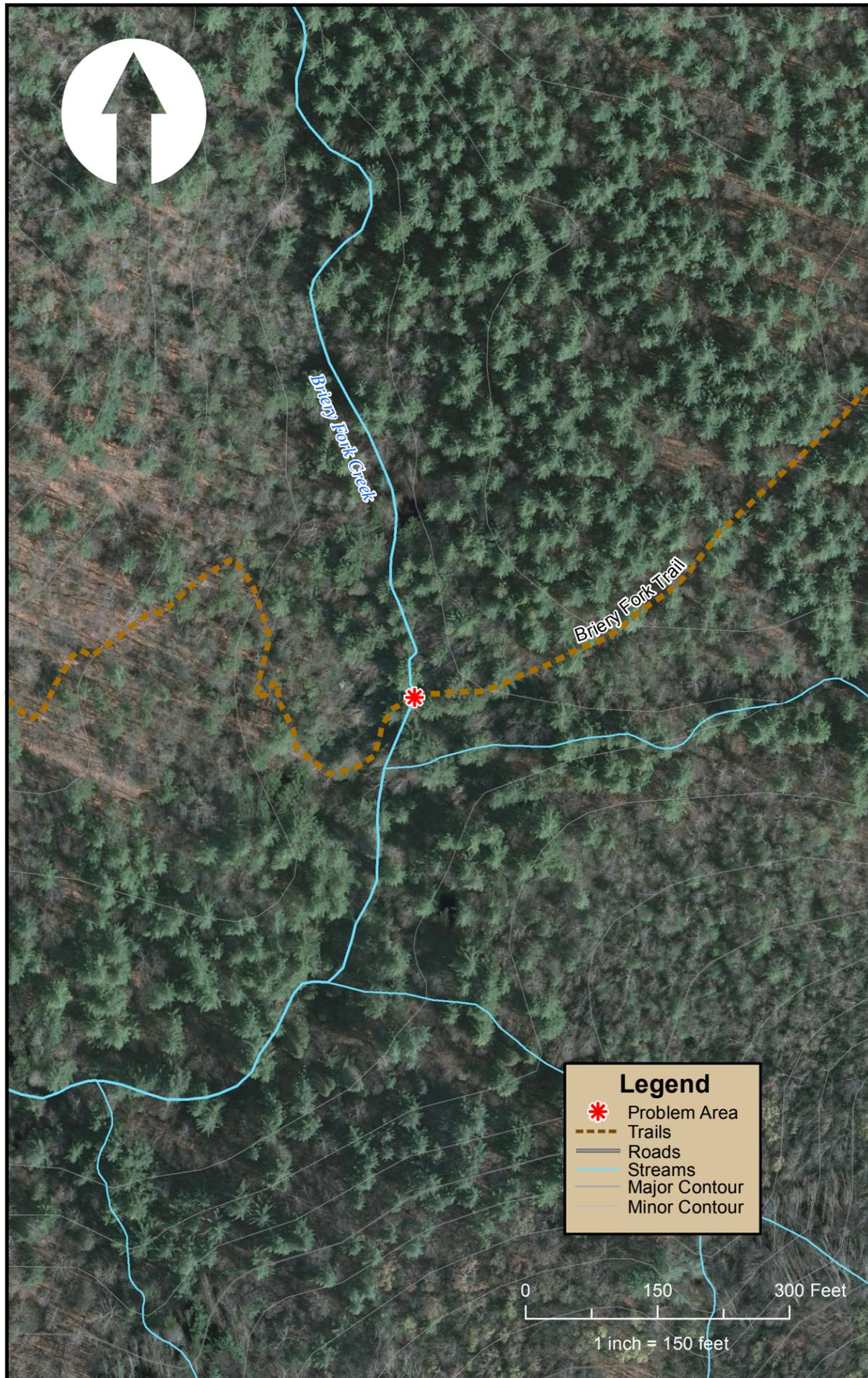
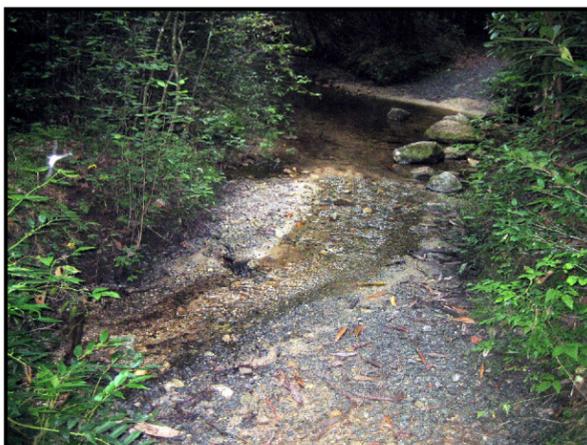


1. **Culvert (diameter/material/length):** _____
 clogged aquatic organism passage/ perched
 crushed erosion (upstream/ downstream)
 lack of natural bed piping
 safety hazard overtopping
2. **Trail/ Road Impact (trail/ road name):** Twin Oaks Trail
 stormwater input sediment input
 bridge utilities
 unstable trail crossing erosion
 safety hazard human impact (hiking/biking)
 missing vegetation equine/dog impacts
3. **Upland/ Stormwater**
 nonpoint source pollution upland erosion
 pollutant point source unvegetated upland area
4. **Lake/Pond/ Reservoir (reservoir name):** _____
 erosion lack of vegetation
 equine impact human impact (hiking/biking)
 safety hazard water quality (temperature, algae, geese, fecal)
5. **Other Problem Area(s)** list contributing factors)

- Potential Solutions**
- | | |
|---|---|
| <input checked="" type="checkbox"/> relocate trail/close trail/road | <input checked="" type="checkbox"/> trail/road crossing improvement |
| <input type="checkbox"/> vegetation/ shoreline planting | <input type="checkbox"/> mechanical grading |
| <input type="checkbox"/> stormwater treatment | <input type="checkbox"/> animal watering |
| <input type="checkbox"/> human/ animal exclusion | <input type="checkbox"/> culvert rehabilitation/ replacement |
| <input type="checkbox"/> signs | <input type="checkbox"/> culvert daylighting |
| <input type="checkbox"/> maintenance | <input type="checkbox"/> bridge replacement/improvement |

Comments
 Trail serves as source of sediment. Eroding banks and head cut in channel downstream of trail are sediment source and may threaten trail.





Area of Concern – Site: P30

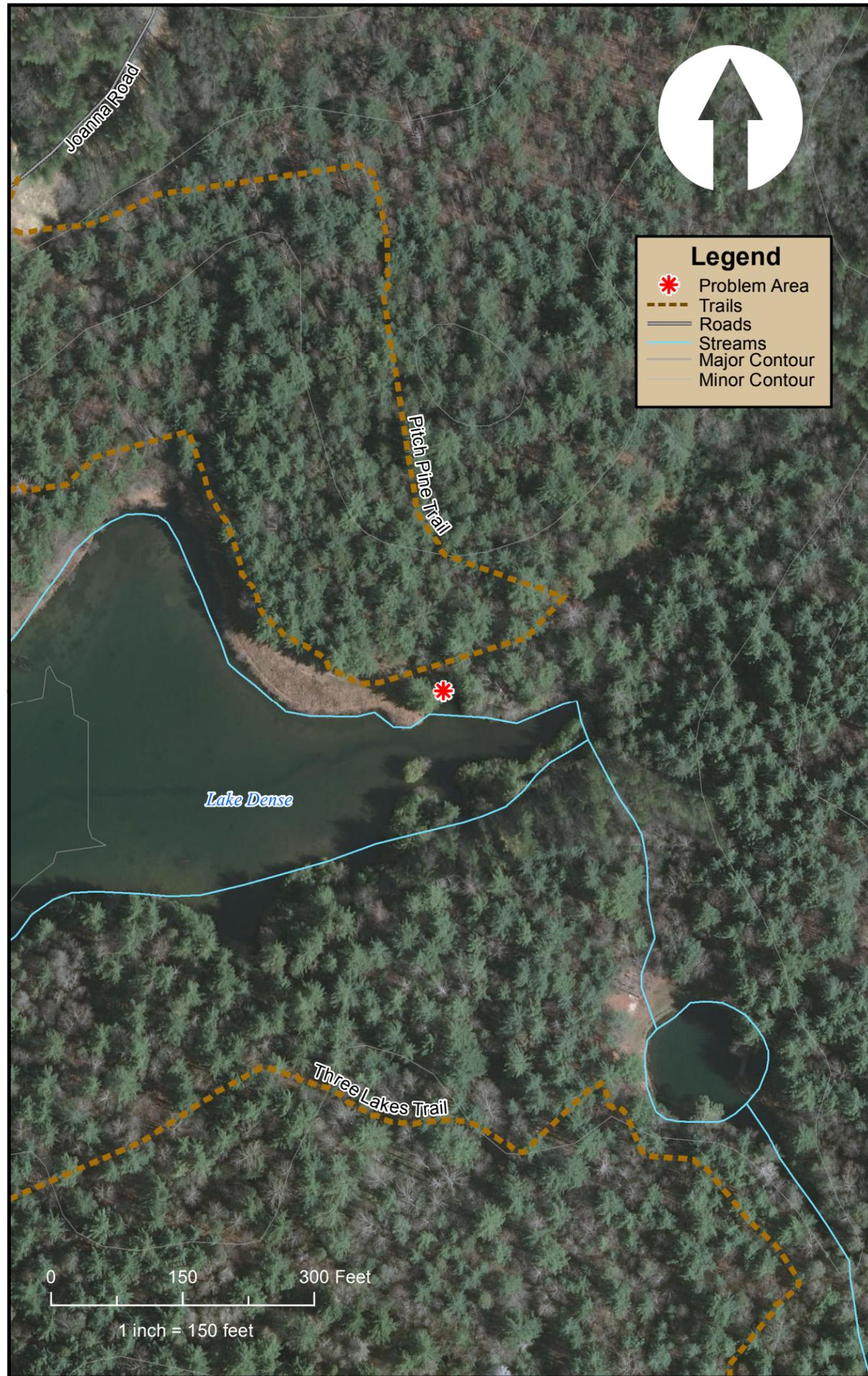
Map Grid Location: I 8 Site visit date/ team): 8/30/15/ JZ Drainage Area (Sq. Mi.): 1.24
 Name & Location: Briery Fork Creek at Briery Fork Creek Trail

1. **Culvert (diameter/material/length):** _____
 clogged aquatic organism passage/ perched
 crushed erosion (upstream/ downstream)
 lack of natural bed piping
 safety hazard overtopping
2. **Trail/ Road Impact (trail/ road name):** Briery Fork Creek Trail
 stormwater input sediment input
 bridge utilities
 unstable trail crossing erosion
 safety hazard human impact (hiking/biking)
 missing vegetation equine/ dog impacts
3. **Upland/ Stormwater**
 nonpoint source pollution upland erosion
 pollutant point source unvegetated upland area
4. **Lake/Pond/ Reservoir (reservoir name):** _____
 erosion lack of vegetation
 equine impact human impact (hiking/biking)
 safety hazard water quality (temperature, algae, geese, fecal)
5. **Other Problem Area(s)** (list contributing factors)

- Potential Solutions**
- relocate trail/close trail/road trail/road crossing improvement
 - vegetation/ shoreline planting mechanical grading
 - stormwater treatment animal watering
 - human/ animal exclusion culvert rehabilitation/ replacement
 - signs culvert daylighting
 - maintenance bridge replacement/improvement

Comments
 At trail crossing, creek is over widened with fine sediment input. A small tributary coincides with the trail.





Area of Concern – Site: P31

Map Grid Location: F7 Site visit date/ team): 8/31/15/ JZ Drainage Area (Sq. Mi.): _____
 Name & Location: Lake Dense

1. **Culvert (diameter/material/length):** _____
 clogged aquatic organism passage/ perched
 crushed erosion (upstream/ downstream)
 lack of natural bed piping
 safety hazard overtopping
2. **Trail/ Road Impact (trail/ road name):** Pitch Pine Trail
 stormwater input sediment input
 bridge utilities
 unstable trail crossing erosion
 safety hazard human impact (hiking/biking)
 missing vegetation equine/dog impacts
3. **Upland/ Stormwater**
 nonpoint source pollution upland erosion
 pollutant point source unvegetated upland area
4. **Lake/Pond/ Reservoir (reservoir name):** Lake Dense
 erosion lack of vegetation
 equine impact human impact (hiking/biking)
 safety hazard water quality (temperature, algae, geese, fecal)
5. **Other Problem Area(s)** (list contributing factors)

Potential Solutions

- | | |
|---|--|
| <input checked="" type="checkbox"/> relocate trail/close trail/road | <input type="checkbox"/> trail/road crossing improvement |
| <input checked="" type="checkbox"/> vegetation/ shoreline planting | <input type="checkbox"/> mechanical grading |
| <input type="checkbox"/> stormwater treatment | <input type="checkbox"/> animal watering |
| <input checked="" type="checkbox"/> human/ animal exclusion | <input type="checkbox"/> culvert rehabilitation/ replacement |
| <input checked="" type="checkbox"/> signs | <input type="checkbox"/> culvert daylighting |
| <input type="checkbox"/> maintenance | <input type="checkbox"/> bridge replacement/improvement |

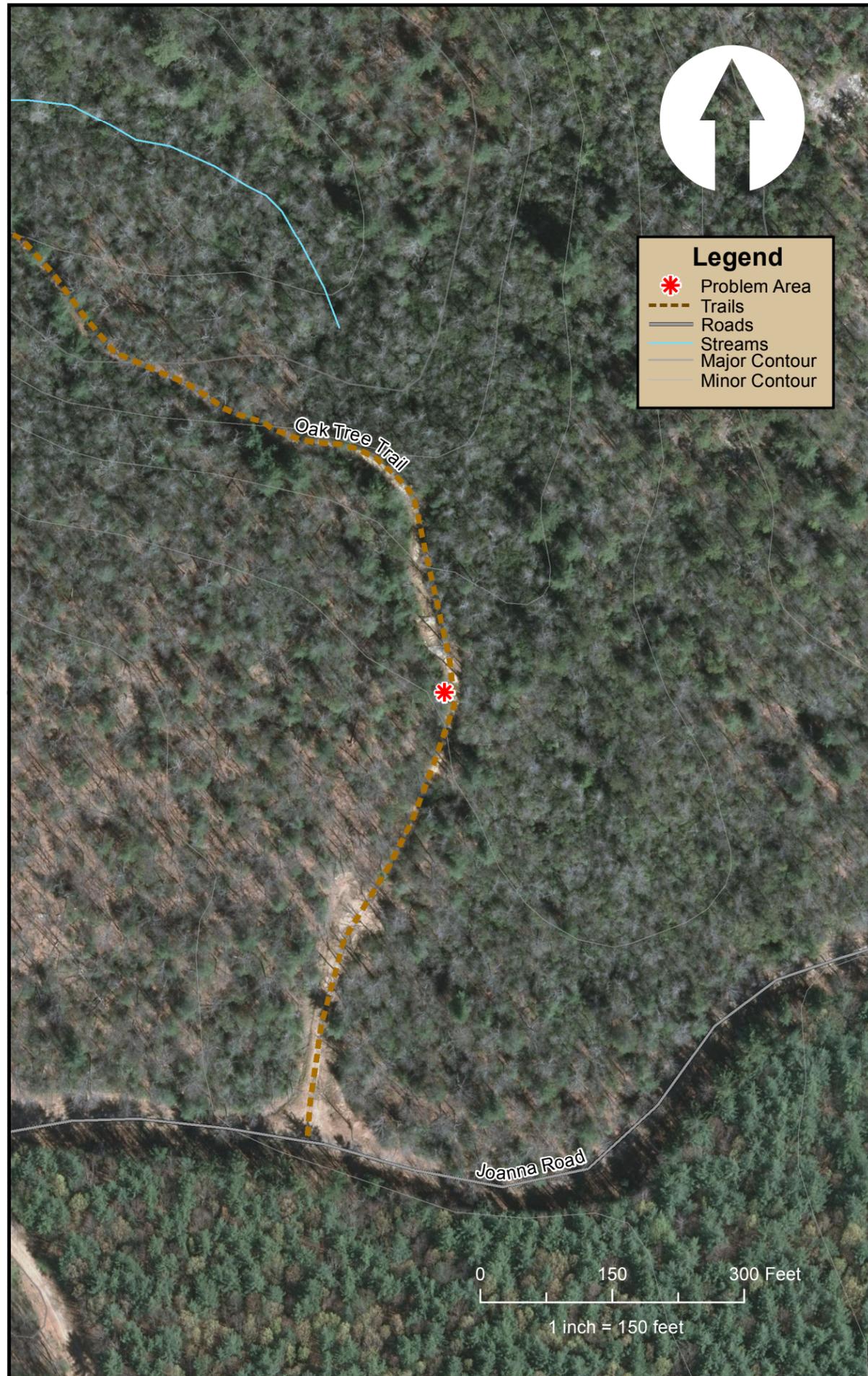
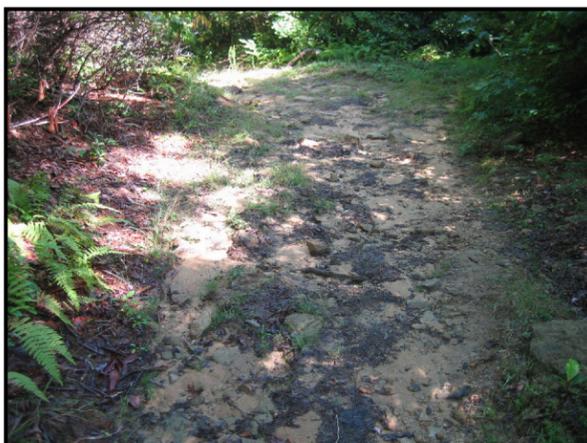
Comments

Unvegetated and bare areas along Pitch Pine Trail on shore of Lake Dense. Trail within lake buffer.



Area of Concern – Site: P32

Map Grid Location: G7 Site visit date/ team): 8/31/15/ JZ Drainage Area (Sq. Mi.): _____
 Name & Location: Oak Tree Trail



1. **Culvert (diameter/material/length):** _____

<input type="checkbox"/> clogged	<input type="checkbox"/> aquatic organism passage/ perched
<input type="checkbox"/> crushed	<input type="checkbox"/> erosion (upstream/ downstream)
<input type="checkbox"/> lack of natural bed	<input type="checkbox"/> piping
<input type="checkbox"/> safety hazard	<input type="checkbox"/> overtopping

2. **Trail/ Road Impact (trail/ road name):** Oak Tree Trail

<input type="checkbox"/> stormwater input	<input checked="" type="checkbox"/> sediment input
<input type="checkbox"/> bridge	<input type="checkbox"/> utilities
<input type="checkbox"/> unstable trail crossing	<input checked="" type="checkbox"/> erosion
<input type="checkbox"/> safety hazard	<input checked="" type="checkbox"/> human impact (hiking/biking)
<input checked="" type="checkbox"/> missing vegetation	<input type="checkbox"/> equine/dog impacts

3. **Upland/ Stormwater**

<input checked="" type="checkbox"/> nonpoint source pollution	<input checked="" type="checkbox"/> upland erosion
<input type="checkbox"/> pollutant point source	<input type="checkbox"/> unvegetated upland area

4. **Lake/Pond/ Reservoir (reservoir name):** _____

<input type="checkbox"/> erosion	<input type="checkbox"/> lack of vegetation
<input type="checkbox"/> equine impact	<input type="checkbox"/> human impact (hiking/biking)
<input type="checkbox"/> safety hazard	<input type="checkbox"/> water quality (temperature, algae, geese, fecal)

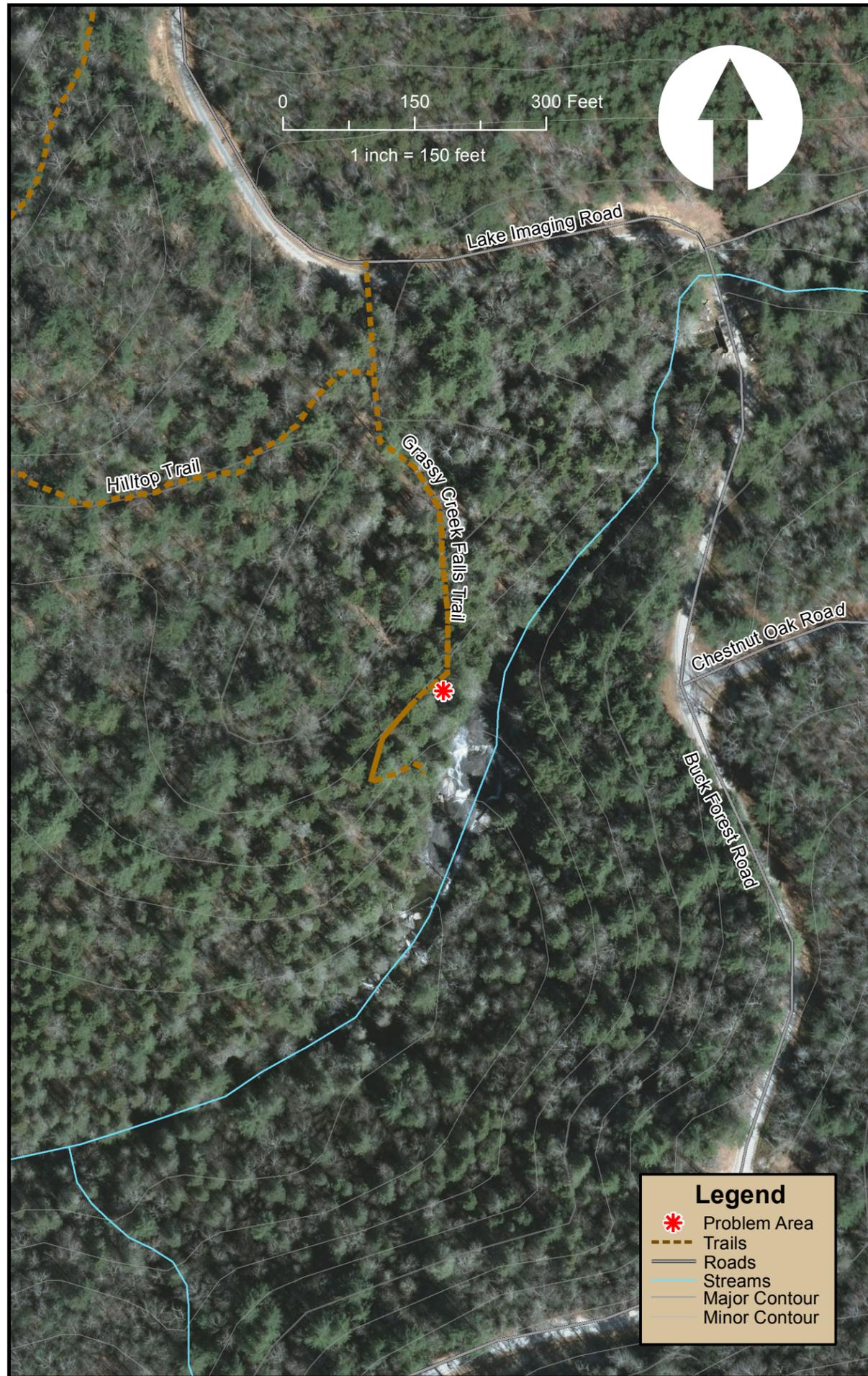
5. **Other Problem Area(s)** (list contributing factors)

Potential Solutions

- | | |
|---|--|
| <input checked="" type="checkbox"/> relocate trail/close trail/road | <input type="checkbox"/> trail/road crossing improvement |
| <input checked="" type="checkbox"/> vegetation/ shoreline planting | <input type="checkbox"/> mechanical grading |
| <input type="checkbox"/> stormwater treatment | <input type="checkbox"/> animal watering |
| <input type="checkbox"/> human/ animal exclusion | <input type="checkbox"/> culvert rehabilitation/ replacement |
| <input type="checkbox"/> signs | <input type="checkbox"/> culvert daylighting |
| <input type="checkbox"/> maintenance | <input type="checkbox"/> bridge replacement/improvement |

Comments

Upland sediment source on eroding, over widened trail. Trail serves as stormwater drainage to receiving water.



Area of Concern – Site: P33

Map Grid Location: F6 Site visit date/ team): 8/31/15/ JZ Drainage Area (Sq. Mi.): _____
 Name & Location: Grassy Creek Falls

- Culvert (diameter/material/length):** _____
 clogged aquatic organism passage/ perched
 crushed erosion (upstream/ downstream)
 lack of natural bed piping
 safety hazard overtopping
- Trail/ Road Impact (trail/ road name):** Grassy Creek Falls Trail
 stormwater input sediment input
 bridge utilities
 unstable trail crossing erosion
 safety hazard human impact (hiking/biking)
 missing vegetation equine/dog impacts
- Upland/ Stormwater**
 nonpoint source pollution upland erosion
 pollutant point source unvegetated upland area
- Lake/Pond/ Reservoir (reservoir name):** _____
 erosion lack of vegetation
 equine impact human impact (hiking/biking)
 safety hazard water quality (temperature, algae, geese, fecal)
- Other Problem Area(s)** list contributing factors)

Potential Solutions

- | | |
|--|--|
| <input type="checkbox"/> relocate trail/close trail/road | <input type="checkbox"/> trail/road crossing improvement |
| <input checked="" type="checkbox"/> vegetation/ shoreline planting | <input type="checkbox"/> mechanical grading |
| <input type="checkbox"/> stormwater treatment | <input type="checkbox"/> animal watering |
| <input checked="" type="checkbox"/> human/ animal exclusion | <input type="checkbox"/> culvert rehabilitation/ replacement |
| <input checked="" type="checkbox"/> signs | <input type="checkbox"/> culvert daylighting |
| <input type="checkbox"/> maintenance | <input type="checkbox"/> bridge replacement/improvement |

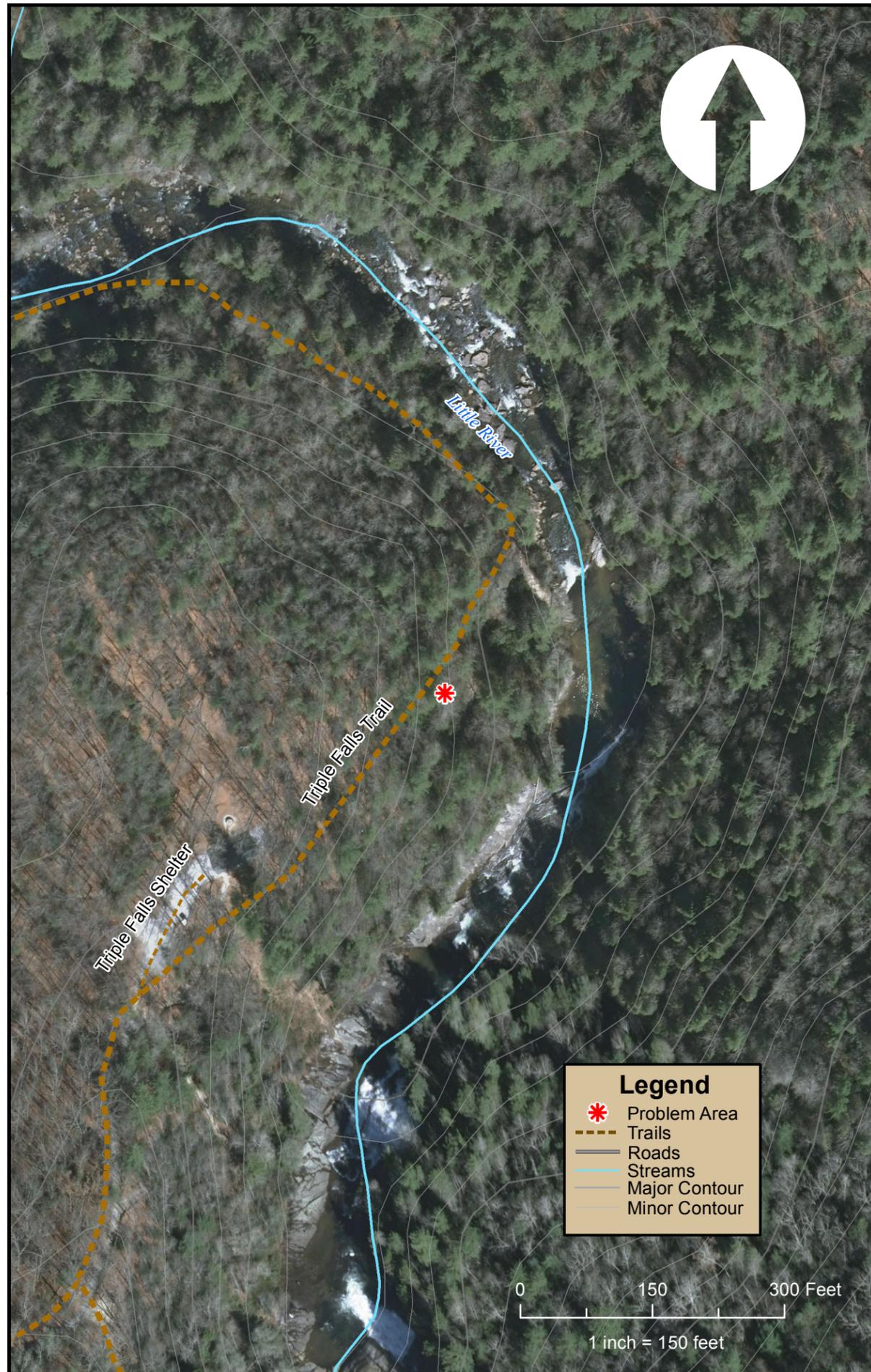
Comments

Human access to Grassy Creek Falls has resulted in bare areas and multiple small trails to access falls.



Area of Concern – Site: P34

Map Grid Location: F5 Site visit date/ team): 8/19/15/ JZ Drainage Area (Sq. Mi.): 33.3
 Name & Location: Triple Falls Trail along Little River



Legend

- * Problem Area
- Trails
- Roads
- Streams
- Major Contour
- Minor Contour

1. **Culvert (diameter/material/length):** _____

<input type="checkbox"/> clogged	<input type="checkbox"/> aquatic organism passage/ perched
<input type="checkbox"/> crushed	<input type="checkbox"/> erosion (upstream/ downstream)
<input type="checkbox"/> lack of natural bed	<input type="checkbox"/> piping
<input type="checkbox"/> safety hazard	<input type="checkbox"/> overtopping

2. **Trail/ Road Impact (trail/ road name):** Triple Falls Trail

<input checked="" type="checkbox"/> stormwater input	<input checked="" type="checkbox"/> sediment input
<input type="checkbox"/> bridge	<input type="checkbox"/> utilities
<input type="checkbox"/> unstable trail crossing	<input checked="" type="checkbox"/> erosion
<input type="checkbox"/> safety hazard	<input checked="" type="checkbox"/> human impact (hiking/biking)
<input checked="" type="checkbox"/> missing vegetation	<input checked="" type="checkbox"/> equine/ dog impacts

3. **Upland/ Stormwater**

<input checked="" type="checkbox"/> nonpoint source pollution	<input checked="" type="checkbox"/> upland erosion
<input type="checkbox"/> pollutant point source	<input checked="" type="checkbox"/> unvegetated upland area

4. **Lake/Pond/ Reservoir (reservoir name):** _____

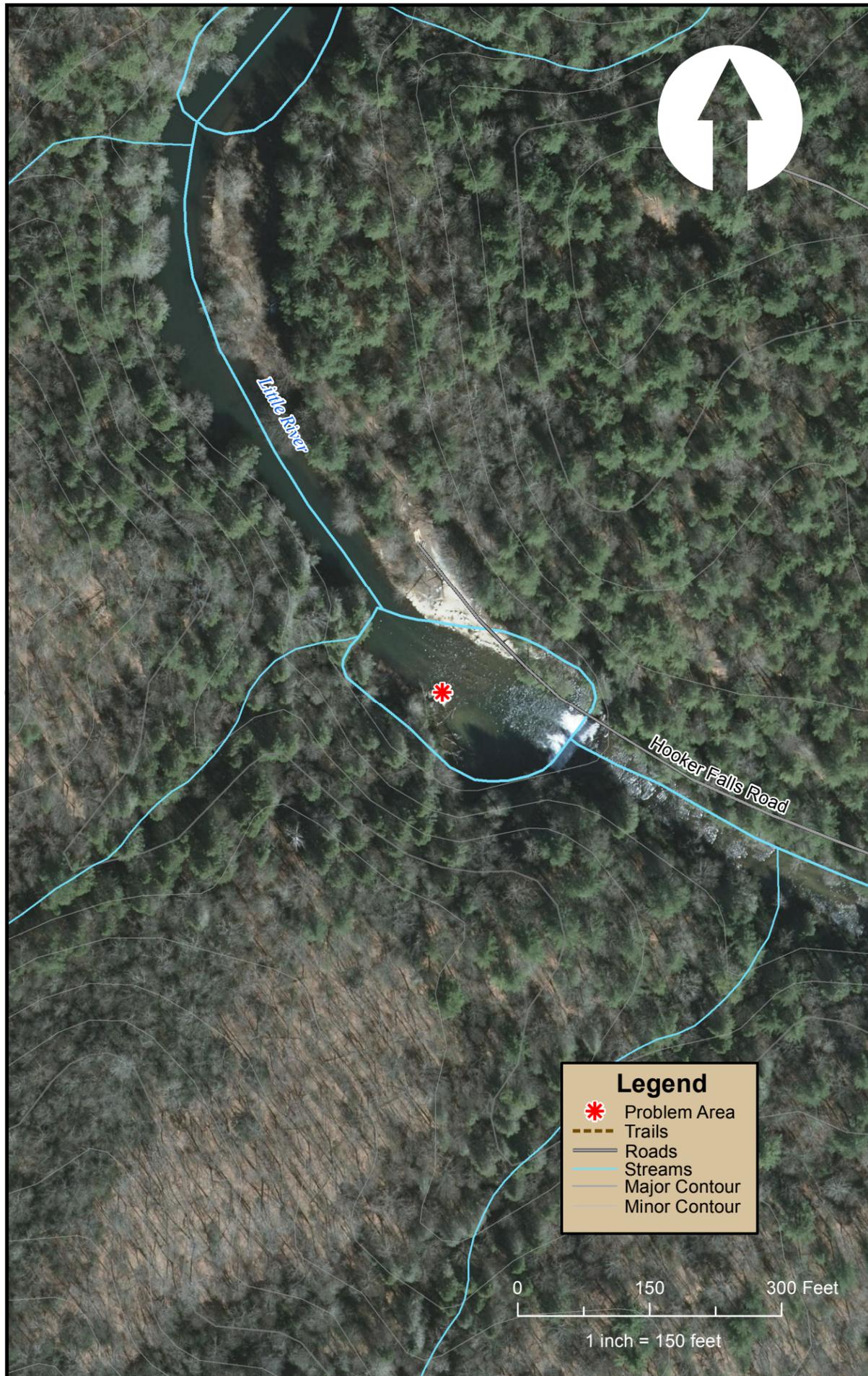
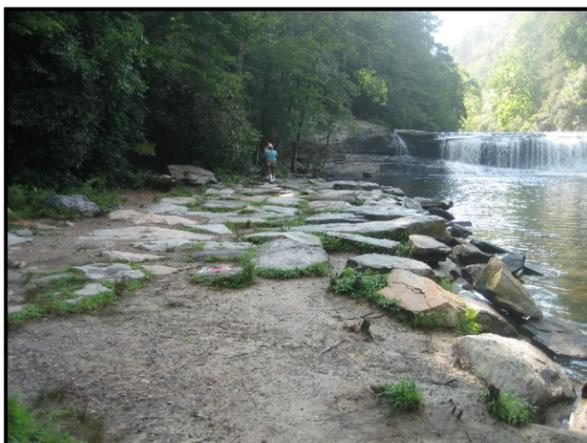
<input type="checkbox"/> erosion	<input type="checkbox"/> lack of vegetation
<input type="checkbox"/> equine impact	<input type="checkbox"/> human impact (hiking/biking)
<input type="checkbox"/> safety hazard	<input type="checkbox"/> water quality (temperature, algae, geese, fecal)

5. **Other Problem Area(s)** (list contributing factors)

- Potential Solutions**
- | | |
|---|--|
| <input checked="" type="checkbox"/> relocate trail/close trail/road | <input type="checkbox"/> trail/road crossing improvement |
| <input checked="" type="checkbox"/> vegetation/ shoreline planting | <input checked="" type="checkbox"/> mechanical grading |
| <input checked="" type="checkbox"/> stormwater treatment | <input type="checkbox"/> animal watering |
| <input checked="" type="checkbox"/> human/ animal exclusion | <input type="checkbox"/> culvert rehabilitation/ replacement |
| <input type="checkbox"/> signs | <input type="checkbox"/> culvert daylighting |
| <input checked="" type="checkbox"/> maintenance | <input type="checkbox"/> bridge replacement/improvement |

Comments
 Trail is wide, steep and eroding along several hundred feet. Heavily used trail could be rerouted or stabilized in place with BMPs.





Area of Concern – Site: P35

Map Grid Location: E5 Site visit date/ team): 8/19/15/ JZ Drainage Area (Sq. Mi.): 35.6
 Name & Location: Hooker Falls

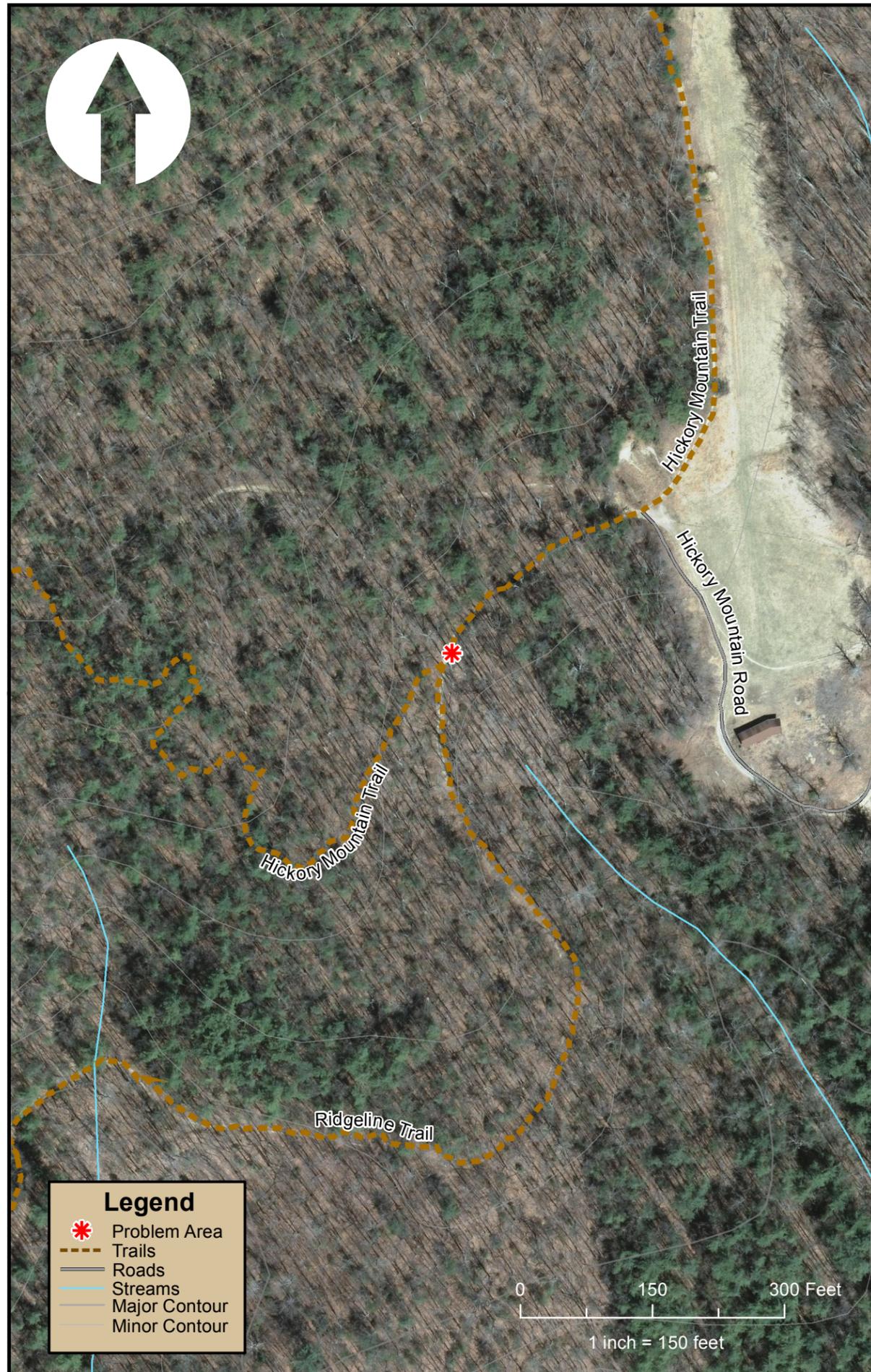
1. **Culvert (diameter/material/length):** _____
 clogged aquatic organism passage/ perched
 crushed erosion (upstream/ downstream)
 lack of natural bed piping
 safety hazard overtopping
2. **Trail/ Road Impact (trail/ road name):** _____
 stormwater input sediment input
 bridge utilities
 unstable trail crossing erosion
 safety hazard human impact (hiking/biking)
 missing vegetation equine/dog impacts
3. **Upland/ Stormwater**
 nonpoint source pollution upland erosion
 pollutant point source unvegetated upland area
4. **Lake/Pond/ Reservoir (reservoir name):** Cascade Lake
 erosion lack of vegetation
 equine impact human impact (hiking/biking)
 safety hazard water quality (temperature, algae, geese, fecal)
5. **Other Problem Area(s)** (list contributing factors)

Potential Solutions

- | | |
|--|--|
| <input type="checkbox"/> relocate trail/close trail/road | <input type="checkbox"/> trail/road crossing improvement |
| <input checked="" type="checkbox"/> vegetation/ shoreline planting | <input checked="" type="checkbox"/> mechanical grading |
| <input type="checkbox"/> stormwater treatment | <input type="checkbox"/> animal watering |
| <input checked="" type="checkbox"/> human/ animal exclusion | <input type="checkbox"/> culvert rehabilitation/ replacement |
| <input checked="" type="checkbox"/> signs | <input type="checkbox"/> culvert daylighting |
| <input checked="" type="checkbox"/> maintenance | <input type="checkbox"/> bridge replacement/improvement |

Comments

Barc areas along viewing area below Hooker Falls.



Area of Concern – Site: P36

Map Grid Location: G2 Site visit date/ team): 8/26/15/ JZ Drainage Area (Sq. Mi.): < 0.1
 Name & Location: Tributary at Hickory Mountain Trail

1. **Culvert (diameter/material/length):** _____
 clogged aquatic organism passage/ perched
 crushed erosion (upstream/ downstream)
 lack of natural bed piping
 safety hazard overtopping
2. **Trail/ Road Impact (trail/ road name):** Hickory Mountain Trail
 stormwater input sediment input
 bridge utilities
 unstable trail crossing erosion
 safety hazard human impact (hiking/biking)
 missing vegetation equine/ dog impacts
3. **Upland/ Stormwater**
 nonpoint source pollution upland erosion
 pollutant point source unvegetated upland area
4. **Lake/Pond/ Reservoir (reservoir name):** _____
 erosion lack of vegetation
 equine impact human impact (hiking/biking)
 safety hazard water quality (temperature, algae, geese, fecal)
5. **Other Problem Area(s)** (list contributing factors)

Potential Solutions

- | | |
|--|---|
| <input type="checkbox"/> relocate trail/close trail/road | <input checked="" type="checkbox"/> trail/road crossing improvement |
| <input type="checkbox"/> vegetation/ shoreline planting | <input type="checkbox"/> mechanical grading |
| <input type="checkbox"/> stormwater treatment | <input type="checkbox"/> animal watering |
| <input type="checkbox"/> human/ animal exclusion | <input type="checkbox"/> culvert rehabilitation/ replacement |
| <input type="checkbox"/> signs | <input type="checkbox"/> culvert daylighting |
| <input type="checkbox"/> maintenance | <input type="checkbox"/> bridge replacement/improvement |

Comments

Intersection of multiple trails result in sediment source to small drainage. Channel drops off steeply downstream of trail, and future head-cut may threaten trail.



Area of Concern – Site: P37

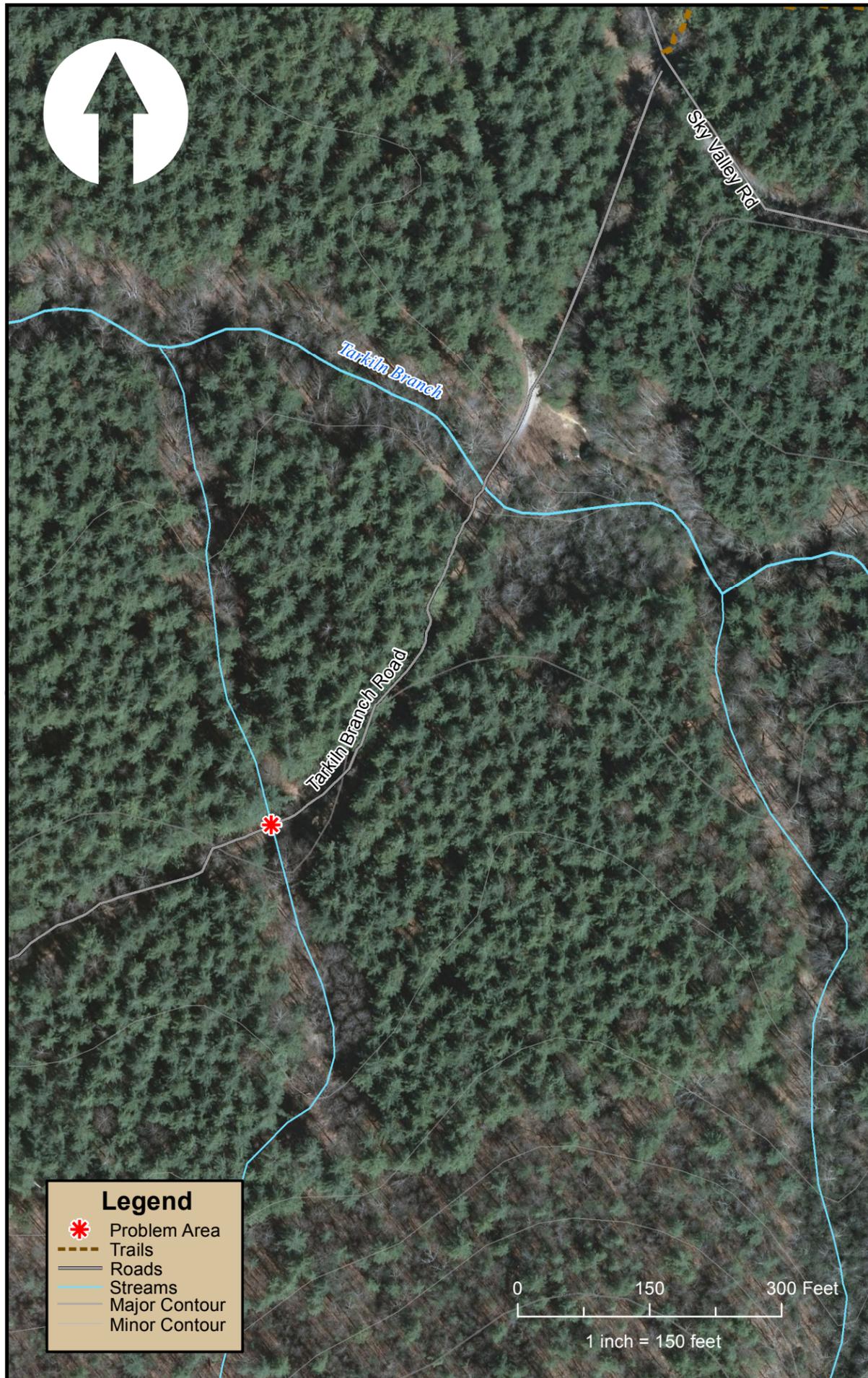
Map Grid Location: H6 Site visit date/ team): 8/26/15/ JZ Drainage Area (Sq. Mi.): < 0.1
 Name & Location: Tributary at Sandy Trail

1. **Culvert (diameter/material/length):** _____
 clogged aquatic organism passage/ perched
 crushed erosion (upstream/ downstream)
 lack of natural bed piping
 safety hazard overtopping
2. **Trail/ Road Impact (trail/ road name):** Sandy Trail
 stormwater input sediment input
 bridge utilities
 unstable trail crossing erosion
 safety hazard human impact (hiking/biking)
 missing vegetation equine/dog impacts
3. **Upland/ Stormwater**
 nonpoint source pollution upland erosion
 pollutant point source unvegetated upland area
4. **Lake/Pond/ Reservoir (reservoir name):** _____
 erosion lack of vegetation
 equine impact human impact (hiking/biking)
 safety hazard water quality (temperature, algae, geese, fecal)
5. **Other Problem Area(s)** (list contributing factors)

- Potential Solutions**
- | | |
|---|---|
| <input checked="" type="checkbox"/> relocate trail/close trail/road | <input checked="" type="checkbox"/> trail/road crossing improvement |
| <input checked="" type="checkbox"/> vegetation/ shoreline planting | <input type="checkbox"/> mechanical grading |
| <input type="checkbox"/> stormwater treatment | <input type="checkbox"/> animal watering |
| <input type="checkbox"/> human/ animal exclusion | <input type="checkbox"/> culvert rehabilitation/ replacement |
| <input type="checkbox"/> signs | <input type="checkbox"/> culvert daylighting |
| <input type="checkbox"/> maintenance | <input type="checkbox"/> bridge replacement/improvement |

Comments
 Hardened trail crossing, though trail still serves as sediment source. Minor bank erosion in channel just downstream of crossing.





Area of Concern – Site: P38

Map Grid Location: H4 Site visit date/ team): 8/26/15/ JZ Drainage Area (Sq. Mi.): < 0.1
 Name & Location: Tributary at Tarkiln Branch Road

1. **Culvert (diameter/material/length):** 16"/ CPP

<input type="checkbox"/> clogged	<input type="checkbox"/> aquatic organism passage/ perched
<input type="checkbox"/> crushed	<input type="checkbox"/> erosion (upstream/ downstream)
<input type="checkbox"/> lack of natural bed	<input type="checkbox"/> piping
<input type="checkbox"/> safety hazard	<input type="checkbox"/> overtopping
2. **Trail/ Road Impact (trail/ road name):** Tarkiln Branch Road

<input type="checkbox"/> stormwater input	<input type="checkbox"/> sediment input
<input type="checkbox"/> bridge	<input type="checkbox"/> utilities
<input type="checkbox"/> unstable trail crossing	<input type="checkbox"/> erosion
<input type="checkbox"/> safety hazard	<input type="checkbox"/> human impact (hiking/biking)
<input checked="" type="checkbox"/> missing vegetation	<input type="checkbox"/> equine/dog impacts
3. **Upland/ Stormwater**

<input type="checkbox"/> nonpoint source pollution	<input type="checkbox"/> upland erosion
<input type="checkbox"/> pollutant point source	<input type="checkbox"/> unvegetated upland area
4. **Lake/Pond/ Reservoir (reservoir name):** _____

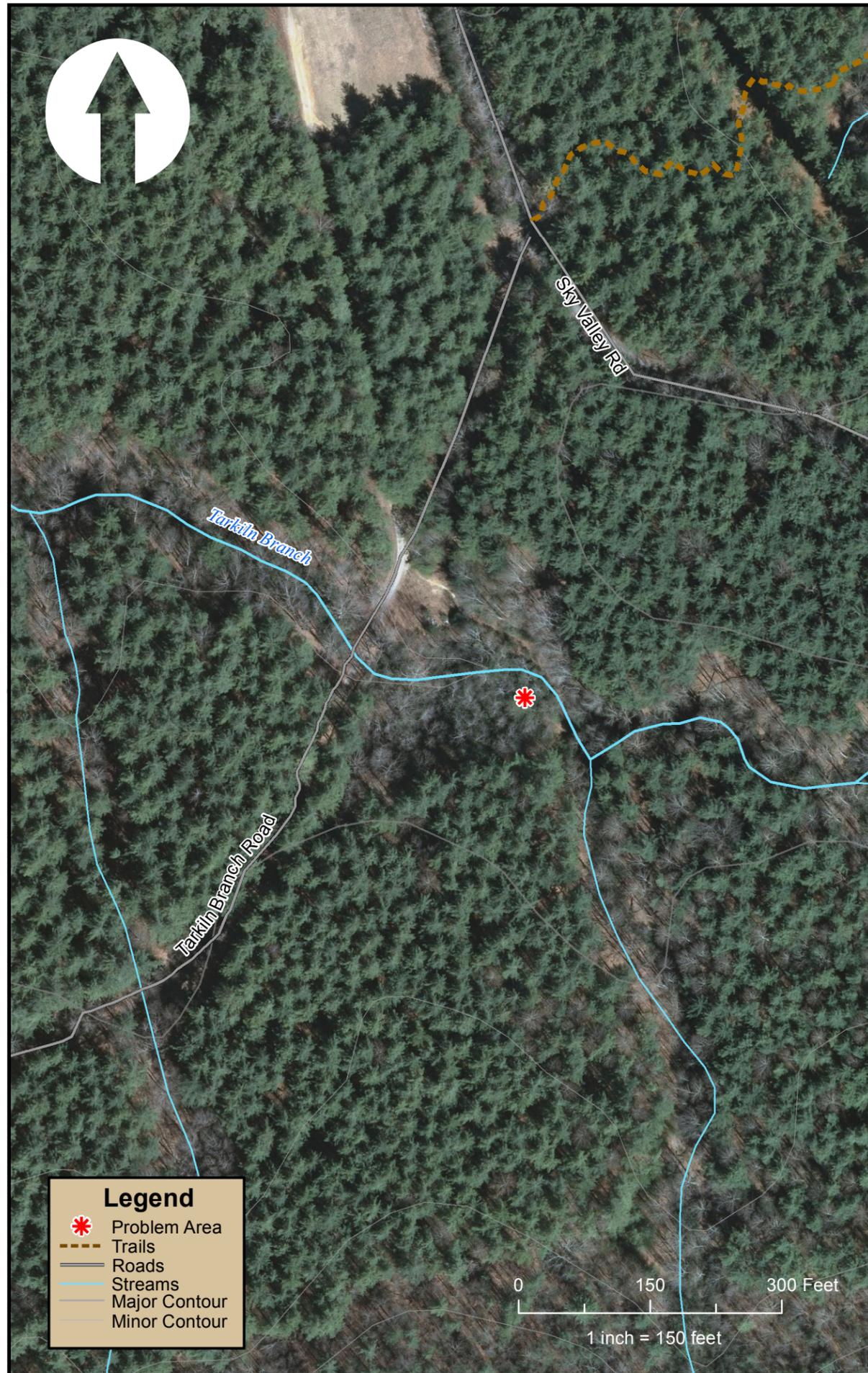
<input type="checkbox"/> erosion	<input type="checkbox"/> lack of vegetation
<input type="checkbox"/> equine impact	<input type="checkbox"/> human impact (hiking/biking)
<input type="checkbox"/> safety hazard	<input type="checkbox"/> water quality (temperature, algae, geese, fecal)
5. **Other Problem Area(s)** (list contributing factors)

Potential Solutions

- | | |
|--|--|
| <input type="checkbox"/> relocate trail/close trail/road | <input type="checkbox"/> trail/road crossing improvement |
| <input checked="" type="checkbox"/> vegetation/ shoreline planting | <input type="checkbox"/> mechanical grading |
| <input type="checkbox"/> stormwater treatment | <input type="checkbox"/> animal watering |
| <input type="checkbox"/> human/ animal exclusion | <input type="checkbox"/> culvert rehabilitation/ replacement |
| <input type="checkbox"/> signs | <input type="checkbox"/> culvert daylighting |
| <input type="checkbox"/> maintenance | <input type="checkbox"/> bridge replacement/improvement |

Comments

Culvert appears to be in good condition; however, bare areas exist in the vicinity.



Area of Concern – Site: P39

Map Grid Location: H4 Site visit date/ team): 8/26/15/ JZ Drainage Area (Sq. Mi.): < 0.1
 Name & Location: Horse watering along Tarklin Branch Road

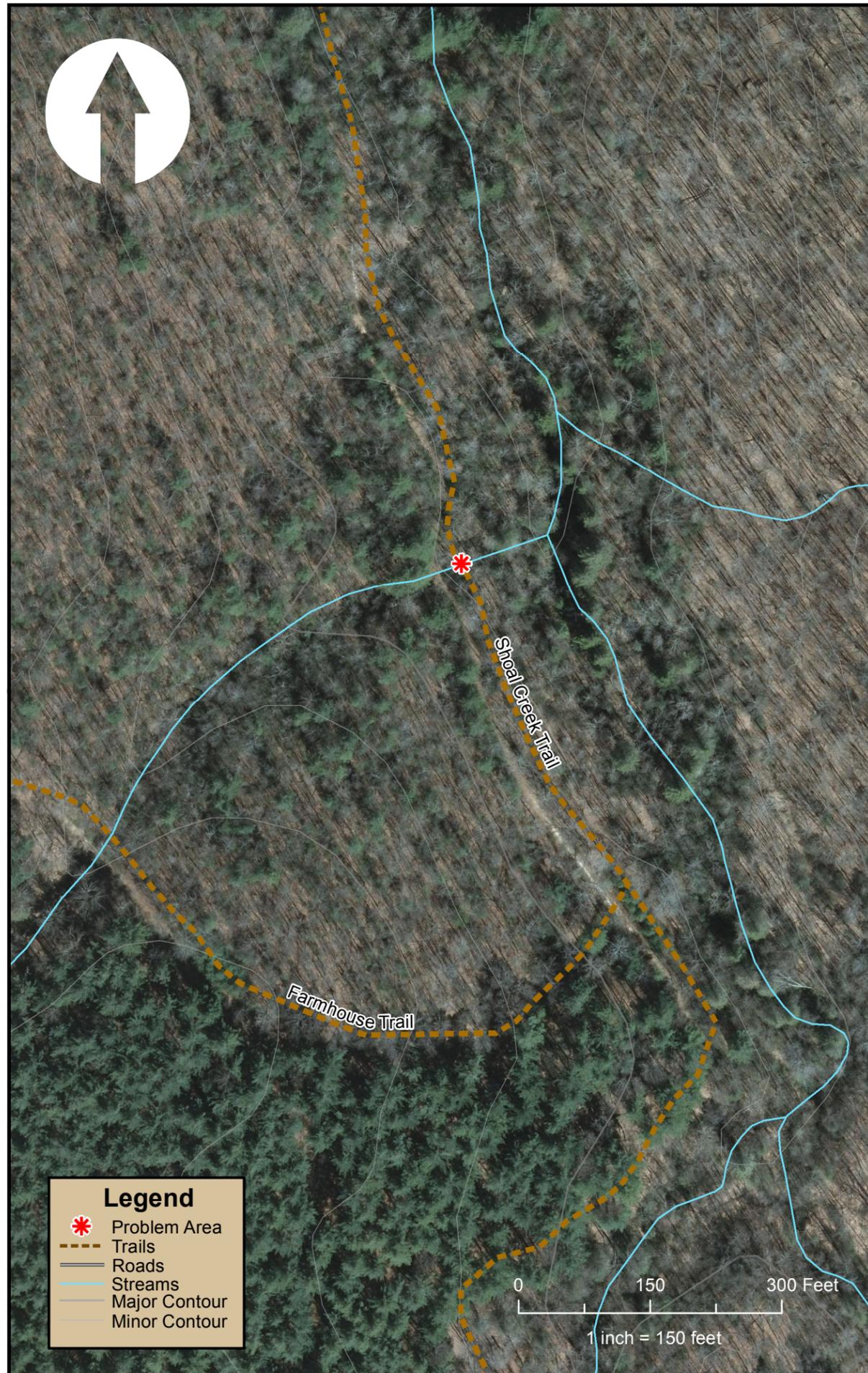
1. **Culvert (diameter/material/length):** _____
 clogged aquatic organism passage/ perched
 crushed erosion (upstream/ downstream)
 lack of natural bed piping
 safety hazard overtopping
2. **Trail/ Road Impact (trail/ road name):** Unnamed trail to horse watering
 stormwater input sediment input
 bridge utilities
 unstable trail crossing erosion
 safety hazard human impact (hiking/biking)
 missing vegetation equine/dog impacts
3. **Upland/ Stormwater**
 nonpoint source pollution upland erosion
 pollutant point source unvegetated upland area
4. **Lake/Pond/ Reservoir (reservoir name):** _____
 erosion lack of vegetation
 equine impact human impact (hiking/biking)
 safety hazard water quality (temperature, algae, geese, fecal)
5. **Other Problem Area(s)** (list contributing factors)

Potential Solutions

- | | |
|---|--|
| <input checked="" type="checkbox"/> relocate trail/close trail/road | <input type="checkbox"/> trail/road crossing improvement |
| <input checked="" type="checkbox"/> vegetation/ shoreline planting | <input type="checkbox"/> mechanical grading |
| <input type="checkbox"/> stormwater treatment | <input checked="" type="checkbox"/> animal watering |
| <input checked="" type="checkbox"/> human/ animal exclusion | <input type="checkbox"/> culvert rehabilitation/ replacement |
| <input checked="" type="checkbox"/> signs | <input type="checkbox"/> culvert daylighting |
| <input type="checkbox"/> maintenance | <input type="checkbox"/> bridge replacement/improvement |

Comments

Trampled banks and sediment input to stream at signed horse watering area. Despite "Dead End Trail" sign, watering area also appears to be used as stream crossing.



Area of Concern – Site: P40

Map Grid Location: H3 Site visit date/ team): 8/26/15/ JZ Drainage Area (Sq. Mi.): < 0.1
 Name & Location: Shoal Creek Tributary at Shoal Creek Trail

1. **Culvert (diameter/material/length):** 10"/ iron

<input type="checkbox"/> clogged	<input type="checkbox"/> aquatic organism passage/ perched
<input type="checkbox"/> crushed	<input checked="" type="checkbox"/> erosion (upstream/ downstream)
<input type="checkbox"/> lack of natural bed	<input type="checkbox"/> piping
<input type="checkbox"/> safety hazard	<input type="checkbox"/> overtopping
2. **Trail/ Road Impact (trail/ road name):** Shoal Creek Trail

<input type="checkbox"/> stormwater input	<input type="checkbox"/> sediment input
<input type="checkbox"/> bridge	<input type="checkbox"/> utilities
<input type="checkbox"/> unstable trail crossing	<input type="checkbox"/> erosion
<input type="checkbox"/> safety hazard	<input type="checkbox"/> human impact (hiking/biking)
<input checked="" type="checkbox"/> missing vegetation	<input type="checkbox"/> equine/dog impacts
3. **Upland/ Stormwater**

<input type="checkbox"/> nonpoint source pollution	<input type="checkbox"/> upland erosion
<input type="checkbox"/> pollutant point source	<input type="checkbox"/> unvegetated upland area
4. **Lake/Pond/ Reservoir (reservoir name):** _____

<input type="checkbox"/> erosion	<input type="checkbox"/> lack of vegetation
<input type="checkbox"/> equine impact	<input type="checkbox"/> human impact (hiking/biking)
<input type="checkbox"/> safety hazard	<input type="checkbox"/> water quality (temperature, algae, geese, fecal)
5. **Other Problem Area(s)** (list contributing factors)

Potential Solutions

- | | |
|--|--|
| <input type="checkbox"/> relocate trail/close trail/road | <input type="checkbox"/> trail/road crossing improvement |
| <input checked="" type="checkbox"/> vegetation/ shoreline planting | <input type="checkbox"/> mechanical grading |
| <input type="checkbox"/> stormwater treatment | <input type="checkbox"/> animal watering |
| <input type="checkbox"/> human/ animal exclusion | <input type="checkbox"/> culvert rehabilitation/ replacement |
| <input type="checkbox"/> signs | <input type="checkbox"/> culvert daylighting |
| <input type="checkbox"/> maintenance | <input type="checkbox"/> bridge replacement/improvement |

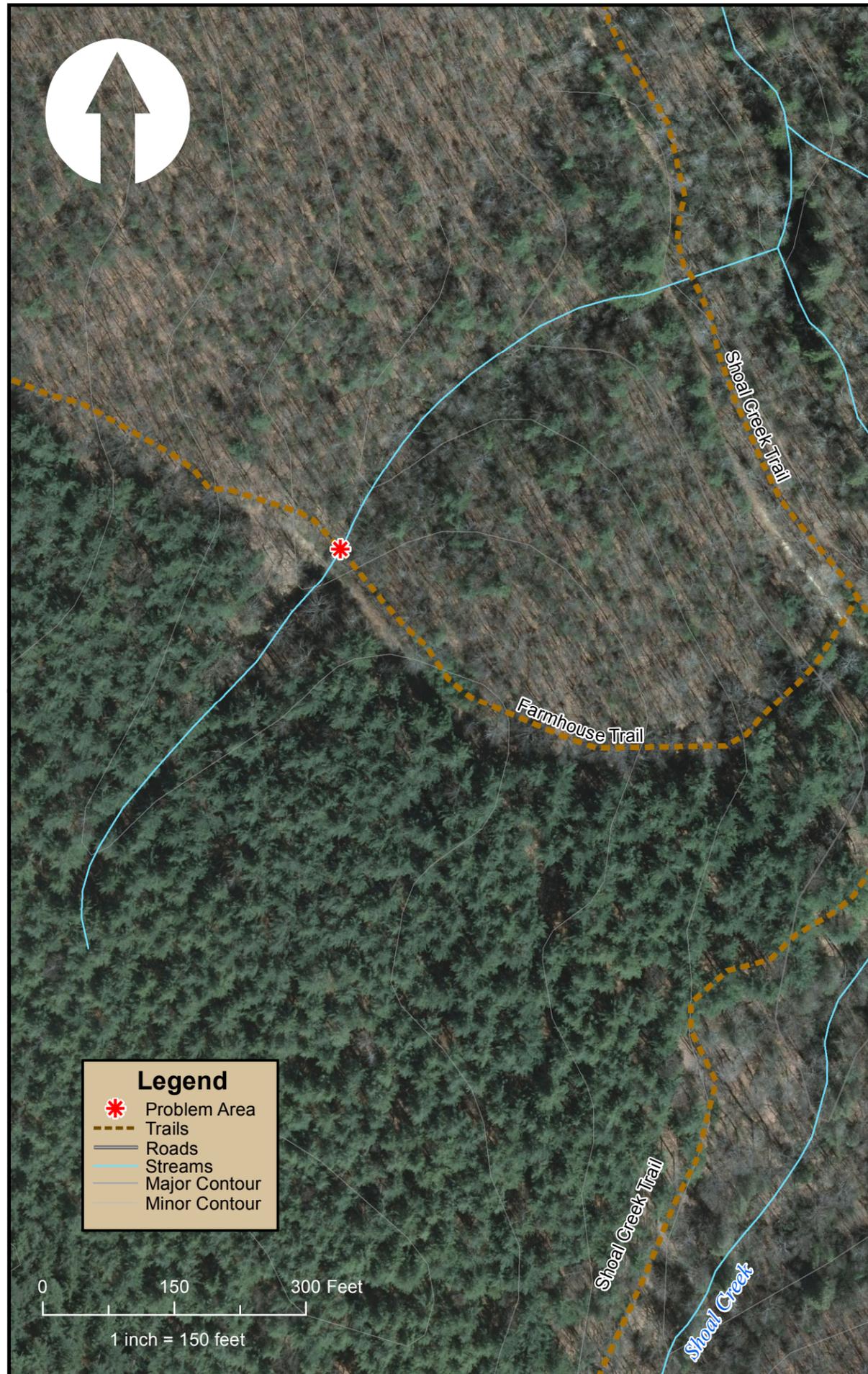
Comments

Culvert appears to be in good condition. Barc areas in vicinity could benefit from vegetation.



Area of Concern – Site: P41

Map Grid Location: H3 Site visit date/ team): 8/26/15/ JZ Drainage Area (Sq. Mi.): < 0.1
 Name & Location: Shoal Creek Tributary at Farmhouse Trail



1. **Culvert (diameter/material/length):** _____

<input type="checkbox"/> clogged	<input type="checkbox"/> aquatic organism passage/ perched
<input type="checkbox"/> crushed	<input type="checkbox"/> erosion (upstream/ downstream)
<input type="checkbox"/> lack of natural bed	<input type="checkbox"/> piping
<input type="checkbox"/> safety hazard	<input type="checkbox"/> overtopping

2. **Trail/ Road Impact (trail/ road name):** Farmhouse Trail

<input checked="" type="checkbox"/> stormwater input	<input checked="" type="checkbox"/> sediment input
<input type="checkbox"/> bridge	<input type="checkbox"/> utilities
<input type="checkbox"/> unstable trail crossing	<input type="checkbox"/> erosion
<input type="checkbox"/> safety hazard	<input type="checkbox"/> human impact (hiking/biking)
<input type="checkbox"/> missing vegetation	<input type="checkbox"/> equine/ dog impacts

3. **Upland/ Stormwater**

<input checked="" type="checkbox"/> nonpoint source pollution	<input checked="" type="checkbox"/> upland erosion
<input type="checkbox"/> pollutant point source	<input type="checkbox"/> unvegetated upland area

4. **Lake/Pond/ Reservoir (reservoir name):** _____

<input type="checkbox"/> erosion	<input type="checkbox"/> lack of vegetation
<input type="checkbox"/> equine impact	<input type="checkbox"/> human impact (hiking/biking)
<input type="checkbox"/> safety hazard	<input type="checkbox"/> water quality (temperature, algae, geese, fecal)

5. **Other Problem Area(s)** (list contributing factors)

Potential Solutions

- | | |
|---|---|
| <input checked="" type="checkbox"/> relocate trail/close trail/road | <input checked="" type="checkbox"/> trail/road crossing improvement |
| <input type="checkbox"/> vegetation/ shoreline planting | <input type="checkbox"/> mechanical grading |
| <input type="checkbox"/> stormwater treatment | <input type="checkbox"/> animal watering |
| <input type="checkbox"/> human/ animal exclusion | <input type="checkbox"/> culvert rehabilitation/ replacement |
| <input type="checkbox"/> signs | <input type="checkbox"/> culvert daylighting |
| <input checked="" type="checkbox"/> maintenance | <input type="checkbox"/> bridge replacement/improvement |

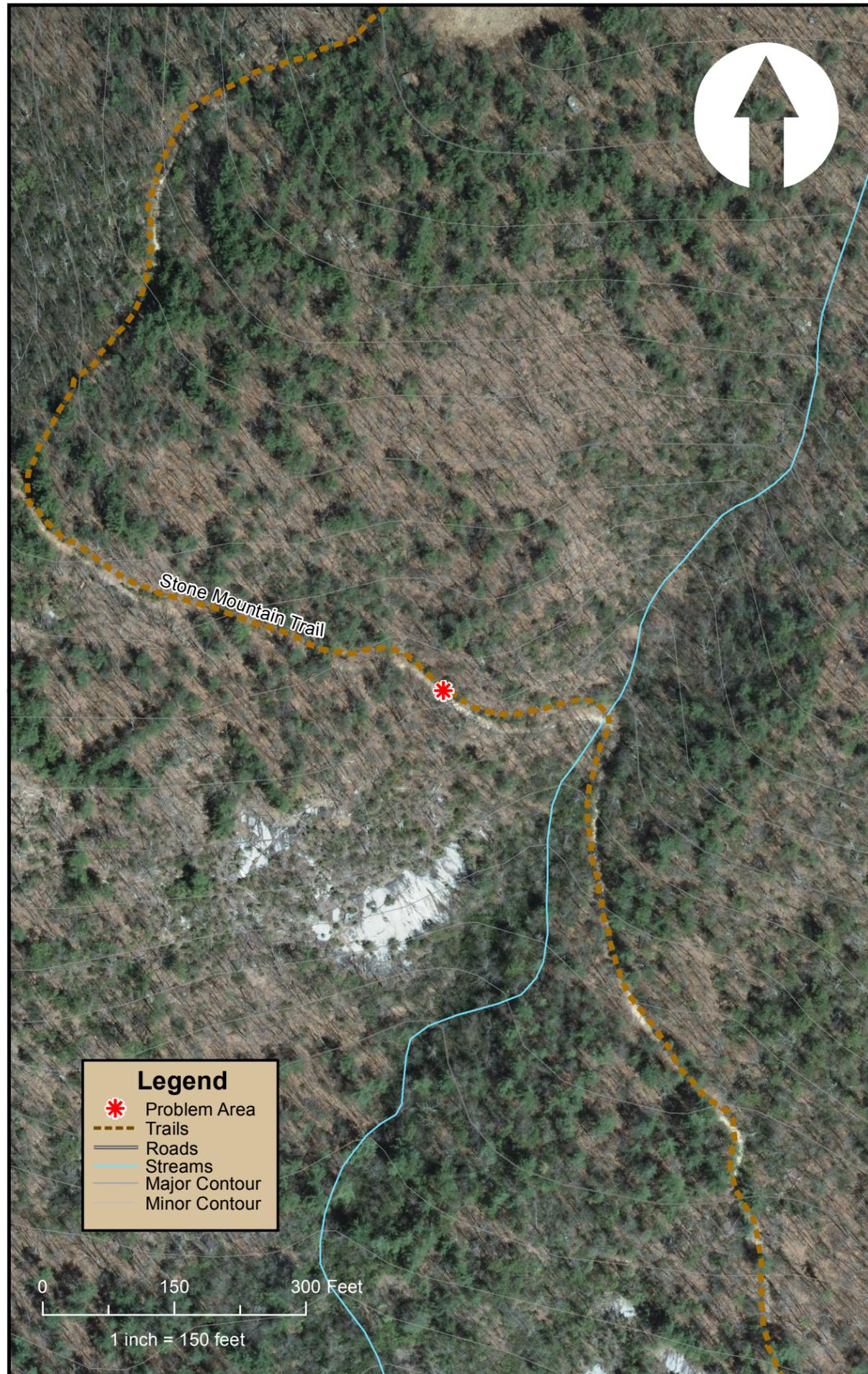
Comments

Farmhouse Trail is steep on both sides of the creek crossing, leading to trail erosion. Sediment traps are full, resulting in fine sediment input to creek. Consider short-term maintenance and/or long-term trail relocation upvalley.



Area of Concern – Site: P42

Map Grid Location: I 2 Site visit date/ team): 8/20/15/ JZ Drainage Area (Sq. Mi.): _____
 Name & Location: Stone Mountain Trail



1. **Culvert (diameter/material/length):** _____

<input type="checkbox"/> clogged	<input type="checkbox"/> aquatic organism passage/ perched
<input type="checkbox"/> crushed	<input type="checkbox"/> erosion (upstream/ downstream)
<input type="checkbox"/> lack of natural bed	<input type="checkbox"/> piping
<input type="checkbox"/> safety hazard	<input type="checkbox"/> overtopping

2. **Trail/ Road Impact (trail/ road name):** Stone Mountain Trail

<input type="checkbox"/> stormwater input	<input checked="" type="checkbox"/> sediment input
<input type="checkbox"/> bridge	<input type="checkbox"/> utilities
<input type="checkbox"/> unstable trail crossing	<input checked="" type="checkbox"/> erosion
<input type="checkbox"/> safety hazard	<input checked="" type="checkbox"/> human impact (hiking/biking)
<input type="checkbox"/> missing vegetation	<input type="checkbox"/> equine/dog impacts

3. **Upland/ Stormwater**

<input checked="" type="checkbox"/> nonpoint source pollution	<input checked="" type="checkbox"/> upland erosion
<input type="checkbox"/> pollutant point source	<input type="checkbox"/> unvegetated upland area

4. **Lake/Pond/ Reservoir (reservoir name):** _____

<input type="checkbox"/> erosion	<input type="checkbox"/> lack of vegetation
<input type="checkbox"/> equine impact	<input type="checkbox"/> human impact (hiking/biking)
<input type="checkbox"/> safety hazard	<input type="checkbox"/> water quality (temperature, algae, geese, fecal)

5. **Other Problem Area(s)** (list contributing factors)

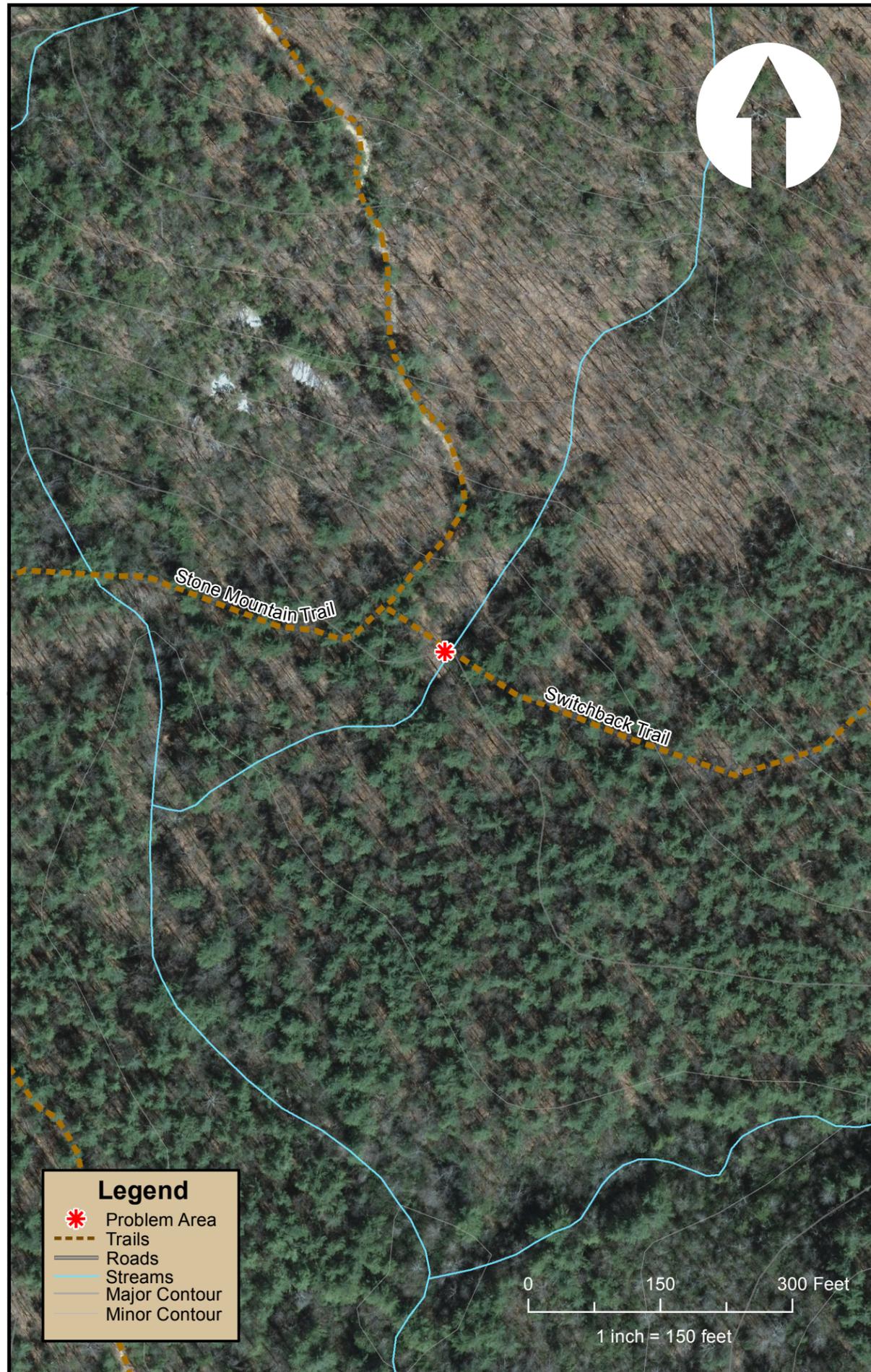
- Potential Solutions**
- | | |
|---|--|
| <input checked="" type="checkbox"/> relocate trail/close trail/road | <input type="checkbox"/> trail/road crossing improvement |
| <input checked="" type="checkbox"/> vegetation/ shoreline planting | <input type="checkbox"/> mechanical grading |
| <input type="checkbox"/> stormwater treatment | <input type="checkbox"/> animal watering |
| <input type="checkbox"/> human/ animal exclusion | <input type="checkbox"/> culvert rehabilitation/ replacement |
| <input type="checkbox"/> signs | <input type="checkbox"/> culvert daylighting |
| <input checked="" type="checkbox"/> maintenance | <input type="checkbox"/> bridge replacement/improvement |

Comments
 Significant upland erosion along much of Stone Mountain Trail.



Area of Concern – Site: P43

Map Grid Location: I 3 Site visit date/ team): 8/20/15/ JZ Drainage Area (Sq. Mi.): < 0.1
 Name & Location: Tributary at Switchback Trail



- 1. Culvert (diameter/material/length):** 8"/ CPP
- | | |
|---|--|
| <input type="checkbox"/> clogged | <input type="checkbox"/> aquatic organism passage/ perched |
| <input type="checkbox"/> crushed | <input checked="" type="checkbox"/> erosion (upstream/ downstream) |
| <input type="checkbox"/> lack of natural bed | <input checked="" type="checkbox"/> piping |
| <input checked="" type="checkbox"/> safety hazard | <input type="checkbox"/> overtopping |

- 2. Trail/ Road Impact (trail/ road name):** _____
- | | |
|--|---|
| <input type="checkbox"/> stormwater input | <input type="checkbox"/> sediment input |
| <input type="checkbox"/> bridge | <input type="checkbox"/> utilities |
| <input type="checkbox"/> unstable trail crossing | <input type="checkbox"/> erosion |
| <input type="checkbox"/> safety hazard | <input type="checkbox"/> human impact (hiking/biking) |
| <input type="checkbox"/> missing vegetation | <input type="checkbox"/> equine/dog impacts |

- 3. Upland/ Stormwater**
- | | |
|--|--|
| <input type="checkbox"/> nonpoint source pollution | <input type="checkbox"/> upland erosion |
| <input type="checkbox"/> pollutant point source | <input type="checkbox"/> unvegetated upland area |

- 4. Lake/Pond/ Reservoir (reservoir name):** _____
- | | |
|--|---|
| <input type="checkbox"/> erosion | <input type="checkbox"/> lack of vegetation |
| <input type="checkbox"/> equine impact | <input type="checkbox"/> human impact (hiking/biking) |
| <input type="checkbox"/> safety hazard | <input type="checkbox"/> water quality (temperature, algae, geese, fecal) |

5. Other Problem Area(s) list contributing factors)

Potential Solutions

- | | |
|---|---|
| <input checked="" type="checkbox"/> relocate trail/close trail/road | <input checked="" type="checkbox"/> trail/road crossing improvement |
| <input type="checkbox"/> vegetation/ shoreline planting | <input type="checkbox"/> mechanical grading |
| <input type="checkbox"/> stormwater treatment | <input type="checkbox"/> animal watering |
| <input type="checkbox"/> human/ animal exclusion | <input checked="" type="checkbox"/> culvert rehabilitation/ replacement |
| <input type="checkbox"/> signs | <input checked="" type="checkbox"/> culvert daylighting |
| <input type="checkbox"/> maintenance | <input type="checkbox"/> bridge replacement/improvement |

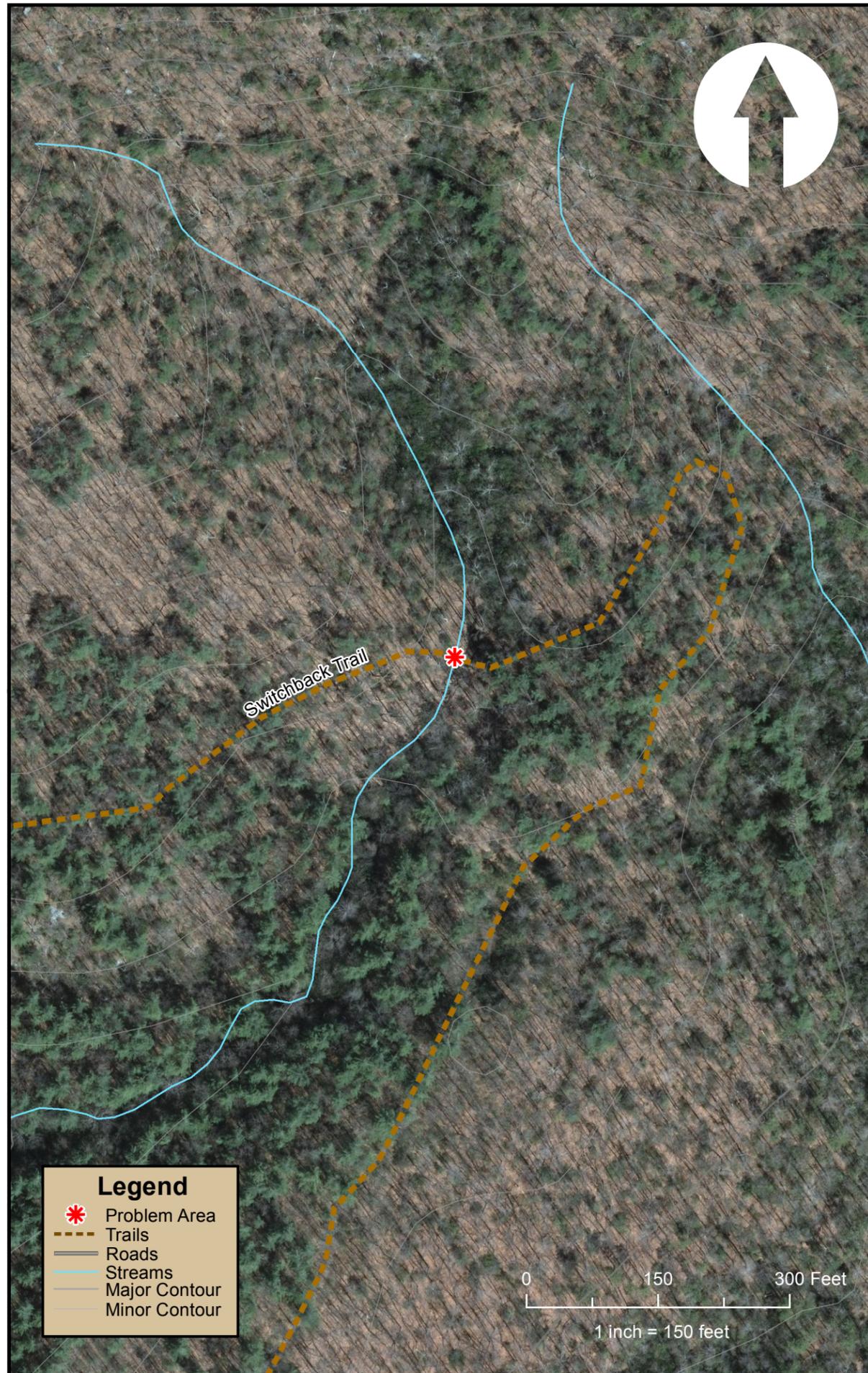
Comments

Culvert failure by piping, leading to trail and downstream channel erosion.



Area of Concern – Site: P44

Map Grid Location: J2 Site visit date/ team): 8/20/15/ JZ Drainage Area (Sq. Mi.): < 0.1
 Name & Location: Tributary at Switchback Trail



Legend

- * Problem Area
- Trails
- Roads
- Streams
- Major Contour
- Minor Contour

0 150 300 Feet
 1 inch = 150 feet

- 1. Culvert (diameter/material/length):** _____
- | | |
|--|--|
| <input type="checkbox"/> clogged | <input type="checkbox"/> aquatic organism passage/ perched |
| <input type="checkbox"/> crushed | <input type="checkbox"/> erosion (upstream/ downstream) |
| <input type="checkbox"/> lack of natural bed | <input type="checkbox"/> piping |
| <input type="checkbox"/> safety hazard | <input type="checkbox"/> overtopping |

- 2. Trail/ Road Impact (trail/ road name):** Switchback Trail
- | | |
|---|---|
| <input type="checkbox"/> stormwater input | <input type="checkbox"/> sediment input |
| <input type="checkbox"/> bridge | <input type="checkbox"/> utilities |
| <input checked="" type="checkbox"/> unstable trail crossing | <input checked="" type="checkbox"/> erosion |
| <input checked="" type="checkbox"/> safety hazard | <input type="checkbox"/> human impact (hiking/biking) |
| <input checked="" type="checkbox"/> missing vegetation | <input type="checkbox"/> equine/dog impacts |

- 3. Upland/ Stormwater**
- | | |
|--|--|
| <input type="checkbox"/> nonpoint source pollution | <input type="checkbox"/> upland erosion |
| <input type="checkbox"/> pollutant point source | <input type="checkbox"/> unvegetated upland area |

- 4. Lake/Pond/ Reservoir (reservoir name):** _____
- | | |
|--|---|
| <input type="checkbox"/> erosion | <input type="checkbox"/> lack of vegetation |
| <input type="checkbox"/> equine impact | <input type="checkbox"/> human impact (hiking/biking) |
| <input type="checkbox"/> safety hazard | <input type="checkbox"/> water quality (temperature, algae, geese, fecal) |

5. Other Problem Area(s) list contributing factors)

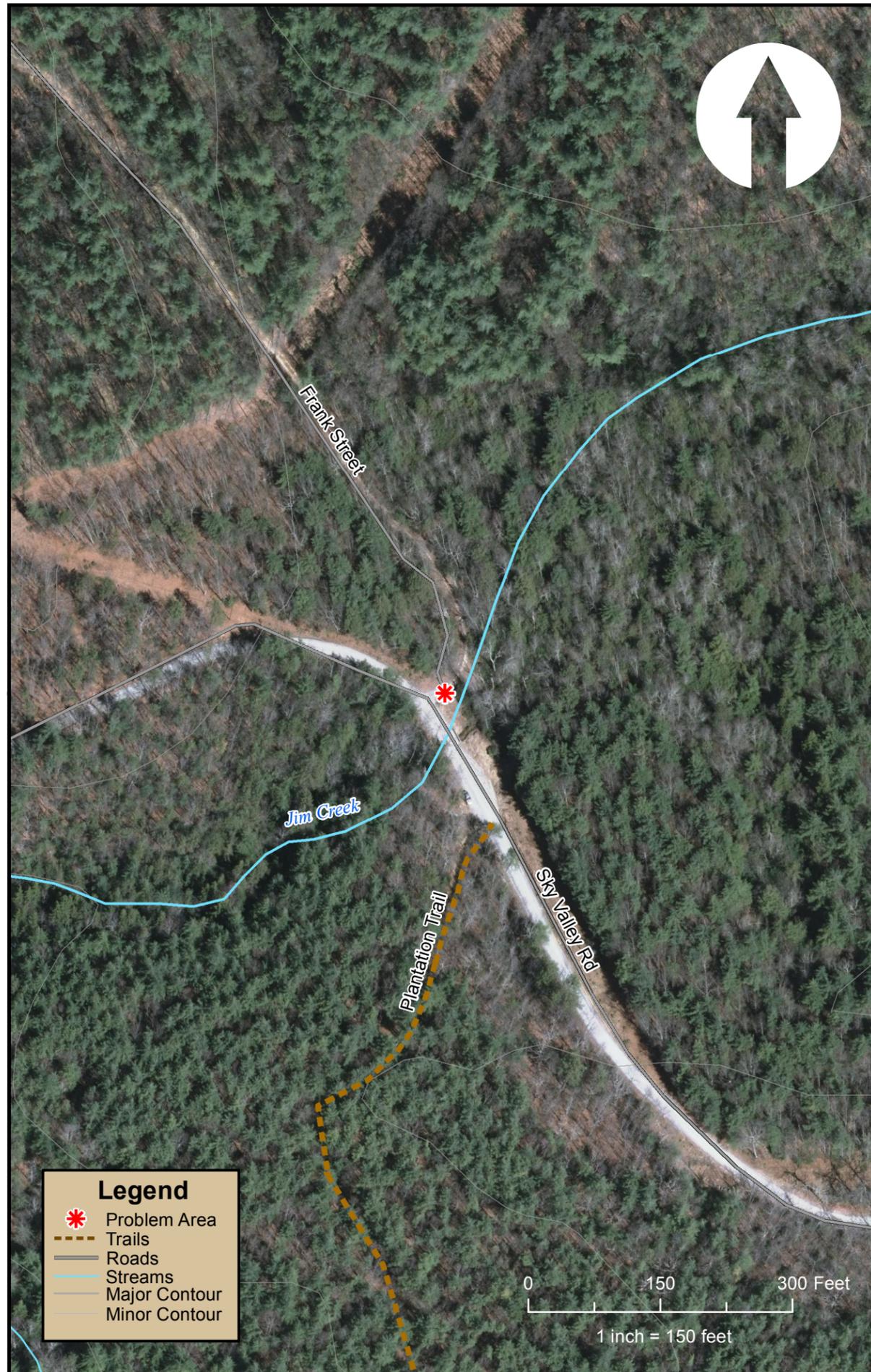
- Potential Solutions**
- | | |
|---|---|
| <input checked="" type="checkbox"/> relocate trail/close trail/road | <input checked="" type="checkbox"/> trail/road crossing improvement |
| <input type="checkbox"/> vegetation/ shoreline planting | <input checked="" type="checkbox"/> mechanical grading |
| <input type="checkbox"/> stormwater treatment | <input type="checkbox"/> animal watering |
| <input checked="" type="checkbox"/> human/ animal exclusion | <input type="checkbox"/> culvert rehabilitation/ replacement |
| <input type="checkbox"/> signs | <input type="checkbox"/> culvert daylighting |
| <input type="checkbox"/> maintenance | <input type="checkbox"/> bridge replacement/improvement |

Comments
 Large eroded hole just downstream of culvert. Trail relocation suggested along with measures to stabilize hole (head-cut).



Area of Concern – Site: P45

Map Grid Location: J3 Site visit date/ team): 8/20/15/ JZ Drainage Area (Sq. Mi.): 1.19
 Name & Location: Sky Valley Road at Jim Creek



- 1. Culvert (diameter/material/length):** _____
- | | |
|--|--|
| <input type="checkbox"/> clogged | <input type="checkbox"/> aquatic organism passage/ perched |
| <input type="checkbox"/> crushed | <input type="checkbox"/> erosion (upstream/ downstream) |
| <input type="checkbox"/> lack of natural bed | <input type="checkbox"/> piping |
| <input type="checkbox"/> safety hazard | <input type="checkbox"/> overtopping |

- 2. Trail/ Road Impact (trail/ road name):** Sky Valley Road
- | | |
|--|---|
| <input checked="" type="checkbox"/> stormwater input | <input checked="" type="checkbox"/> sediment input |
| <input checked="" type="checkbox"/> bridge | <input type="checkbox"/> utilities |
| <input type="checkbox"/> unstable trail crossing | <input type="checkbox"/> erosion |
| <input type="checkbox"/> safety hazard | <input type="checkbox"/> human impact (hiking/biking) |
| <input type="checkbox"/> missing vegetation | <input type="checkbox"/> equine/dog impacts |

- 3. Upland/ Stormwater**
- | | |
|--|--|
| <input type="checkbox"/> nonpoint source pollution | <input type="checkbox"/> upland erosion |
| <input type="checkbox"/> pollutant point source | <input type="checkbox"/> unvegetated upland area |

- 4. Lake/Pond/ Reservoir (reservoir name):** _____
- | | |
|--|---|
| <input type="checkbox"/> erosion | <input type="checkbox"/> lack of vegetation |
| <input type="checkbox"/> equine impact | <input type="checkbox"/> human impact (hiking/biking) |
| <input type="checkbox"/> safety hazard | <input type="checkbox"/> water quality (temperature, algae, geese, fecal) |

5. Other Problem Area(s) list contributing factors)

Potential Solutions

- | | |
|--|---|
| <input type="checkbox"/> relocate trail/close trail/road | <input checked="" type="checkbox"/> trail/road crossing improvement |
| <input type="checkbox"/> vegetation/ shoreline planting | <input type="checkbox"/> mechanical grading |
| <input type="checkbox"/> stormwater treatment | <input type="checkbox"/> animal watering |
| <input type="checkbox"/> human/ animal exclusion | <input type="checkbox"/> culvert rehabilitation/ replacement |
| <input type="checkbox"/> signs | <input type="checkbox"/> culvert daylighting |
| <input checked="" type="checkbox"/> maintenance | <input type="checkbox"/> bridge replacement/improvement |

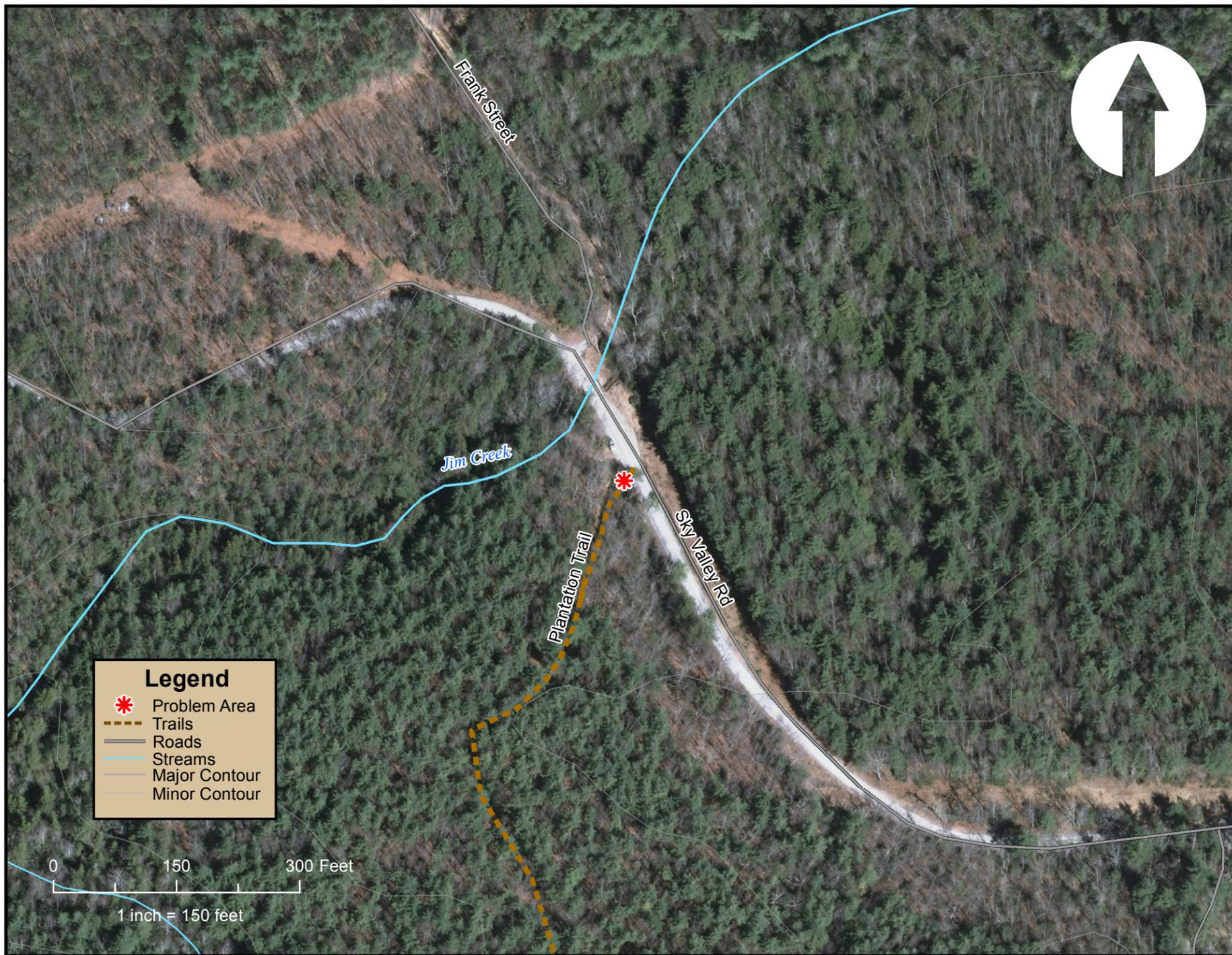
Comments

Gravel road serves as source of fine sediment to Jim Creek. Space appears to exist for BMPs on either side of creek.



Area of Concern – Site: P46

Map Grid Location: J3-4 Site visit date/ team): 8/20/15/ JZ Drainage Area (Sq. Mi.): < 0.1
 Name & Location: Plantation Trail at Sky Valley Road



- 1. Culvert (diameter/material/length):** 12"/ CPP
- | | |
|--|--|
| <input checked="" type="checkbox"/> clogged | <input type="checkbox"/> aquatic organism passage/ perched |
| <input checked="" type="checkbox"/> crushed | <input type="checkbox"/> erosion (upstream/ downstream) |
| <input type="checkbox"/> lack of natural bed | <input type="checkbox"/> piping |
| <input type="checkbox"/> safety hazard | <input type="checkbox"/> overtopping |

- 2. Trail/ Road Impact (trail/ road name):** _____
- | | |
|--|---|
| <input type="checkbox"/> stormwater input | <input type="checkbox"/> sediment input |
| <input type="checkbox"/> bridge | <input type="checkbox"/> utilities |
| <input type="checkbox"/> unstable trail crossing | <input type="checkbox"/> erosion |
| <input type="checkbox"/> safety hazard | <input type="checkbox"/> human impact (hiking/biking) |
| <input type="checkbox"/> missing vegetation | <input type="checkbox"/> equine/dog impacts |

- 3. Upland/ Stormwater**
- | | |
|--|--|
| <input type="checkbox"/> nonpoint source pollution | <input type="checkbox"/> upland erosion |
| <input type="checkbox"/> pollutant point source | <input type="checkbox"/> unvegetated upland area |

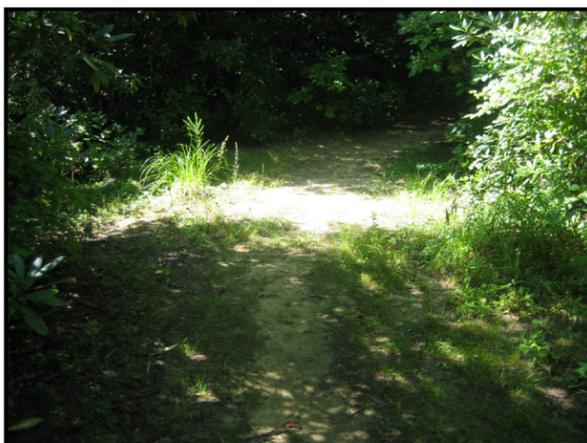
- 4. Lake/Pond/ Reservoir (reservoir name):** _____
- | | |
|--|---|
| <input type="checkbox"/> erosion | <input type="checkbox"/> lack of vegetation |
| <input type="checkbox"/> equine impact | <input type="checkbox"/> human impact (hiking/biking) |
| <input type="checkbox"/> safety hazard | <input type="checkbox"/> water quality (temperature, algac, geese, fecal) |

5. Other Problem Area(s) (list contributing factors)

- Potential Solutions**
- | | |
|---|---|
| <input checked="" type="checkbox"/> relocate trail/close trail/road | <input type="checkbox"/> trail/road crossing improvement |
| <input type="checkbox"/> vegetation/ shoreline planting | <input type="checkbox"/> mechanical grading |
| <input type="checkbox"/> stormwater treatment | <input type="checkbox"/> animal watering |
| <input type="checkbox"/> human/ animal exclusion | <input checked="" type="checkbox"/> culvert rehabilitation/ replacement |
| <input type="checkbox"/> signs | <input type="checkbox"/> culvert daylighting |
| <input type="checkbox"/> maintenance | <input type="checkbox"/> bridge replacement/improvement |

Comments
 Culvert under Plantation Trail filled with road sediment and perhaps crushed.





Area of Concern – Site: P47

Map Grid Location: J4 Site visit date/ team): 8/20/15/ JZ Drainage Area (Sq. Mi.): < 0.1
 Name & Location: Tributary at Plantation Trail

1. **Culvert (diameter/material/length):** 18"/ CPP

<input type="checkbox"/> clogged	<input type="checkbox"/> aquatic organism passage/ perched
<input type="checkbox"/> crushed	<input checked="" type="checkbox"/> erosion (upstream/ downstream)
<input type="checkbox"/> lack of natural bed	<input type="checkbox"/> piping
<input type="checkbox"/> safety hazard	<input type="checkbox"/> overtopping

2. **Trail/ Road Impact (trail/ road name):** Plantation Trail

<input type="checkbox"/> stormwater input	<input type="checkbox"/> sediment input
<input type="checkbox"/> bridge	<input type="checkbox"/> utilities
<input type="checkbox"/> unstable trail crossing	<input type="checkbox"/> erosion
<input type="checkbox"/> safety hazard	<input type="checkbox"/> human impact (hiking/biking)
<input checked="" type="checkbox"/> missing vegetation	<input type="checkbox"/> equine/ dog impacts

3. **Upland/ Stormwater**

<input type="checkbox"/> nonpoint source pollution	<input type="checkbox"/> upland erosion
<input type="checkbox"/> pollutant point source	<input type="checkbox"/> unvegetated upland area

4. **Lake/Pond/ Reservoir (reservoir name):** _____

<input type="checkbox"/> erosion	<input type="checkbox"/> lack of vegetation
<input type="checkbox"/> equine impact	<input type="checkbox"/> human impact (hiking/biking)
<input type="checkbox"/> safety hazard	<input type="checkbox"/> water quality (temperature, algae, geese, fecal)

5. **Other Problem Area(s)** (list contributing factors)

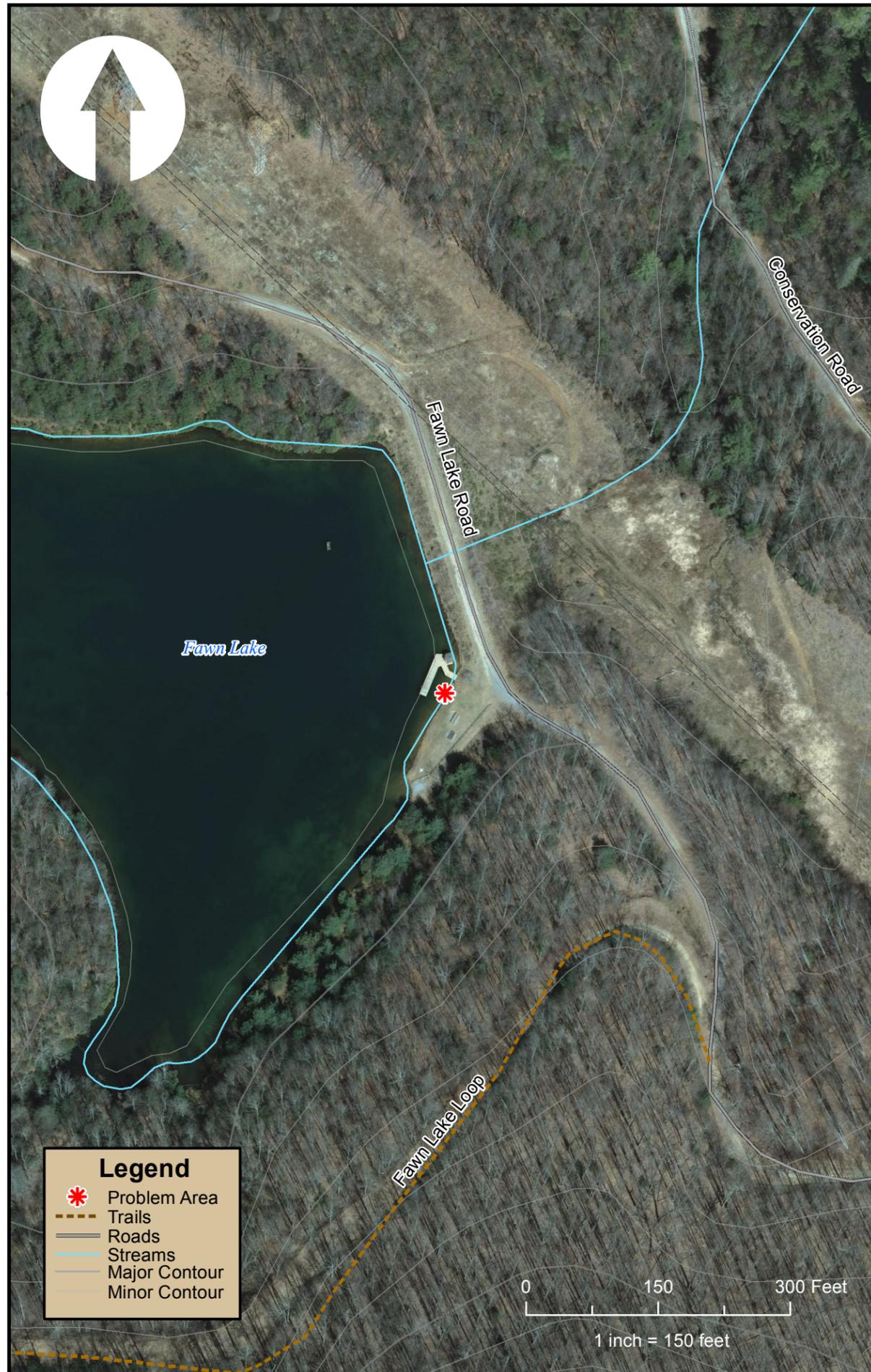
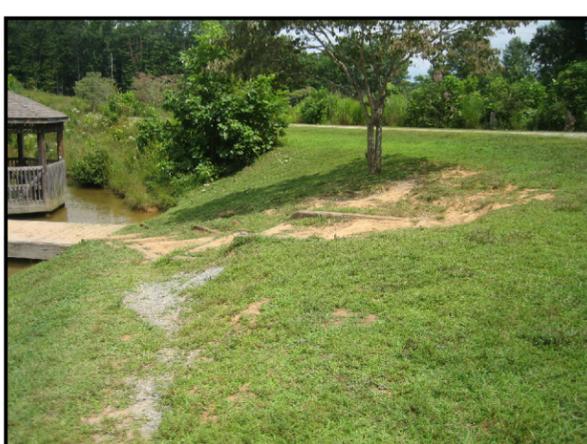
Potential Solutions

- | | |
|--|--|
| <input type="checkbox"/> relocate trail/close trail/road | <input type="checkbox"/> trail/road crossing improvement |
| <input checked="" type="checkbox"/> vegetation/ shoreline planting | <input type="checkbox"/> mechanical grading |
| <input type="checkbox"/> stormwater treatment | <input type="checkbox"/> animal watering |
| <input type="checkbox"/> human/ animal exclusion | <input type="checkbox"/> culvert rehabilitation/ replacement |
| <input type="checkbox"/> signs | <input type="checkbox"/> culvert daylighting |
| <input type="checkbox"/> maintenance | <input type="checkbox"/> bridge replacement/improvement |

Comments

No problems with culvert. However, trail in vicinity is over widened and lacking vegetation.





Area of Concern – Site: P48

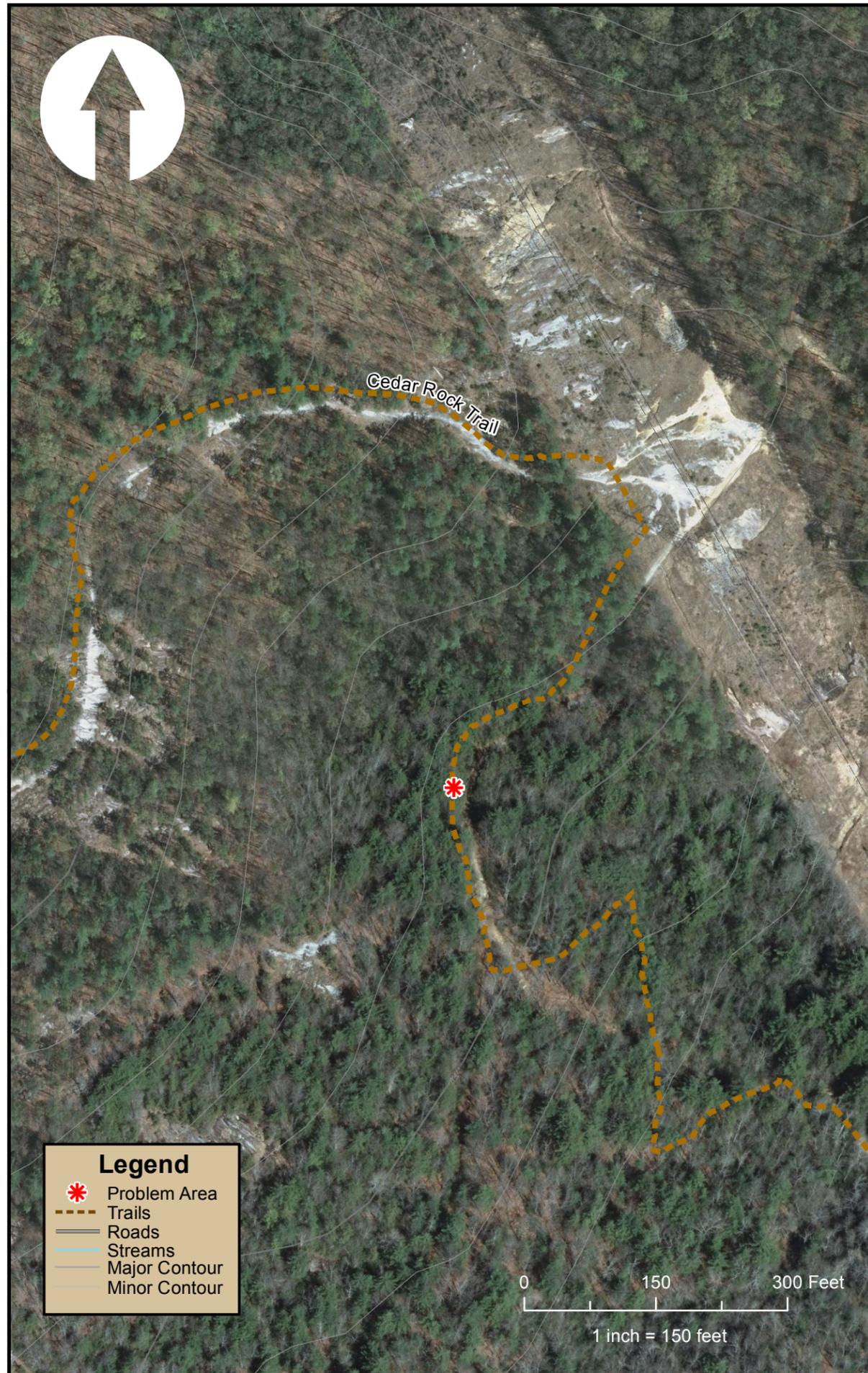
Map Grid Location: F11 Site visit date/ team): 8/17/15/ JZ Drainage Area (Sq. Mi.): _____
 Name & Location: Fawn Lake

1. **Culvert (diameter/material/length):** _____
 clogged aquatic organism passage/ perched
 crushed erosion (upstream/ downstream)
 lack of natural bed piping
 safety hazard overtopping
2. **Trail/ Road Impact (trail/ road name):** _____
 stormwater input sediment input
 bridge utilities
 unstable trail crossing erosion
 safety hazard human impact (hiking/biking)
 missing vegetation equine/dog impacts
3. **Upland/ Stormwater**
 nonpoint source pollution upland erosion
 pollutant point source unvegetated upland area
4. **Lake/Pond/ Reservoir (reservoir name):** Fawn Lake
 erosion lack of vegetation
 equine impact human impact (hiking/biking)
 safety hazard water quality (temperature, algae, geese, fecal)
5. **Other Problem Area(s)** (list contributing factors)

- Potential Solutions**
- | | |
|--|--|
| <input type="checkbox"/> relocate trail/close trail/road | <input type="checkbox"/> trail/road crossing improvement |
| <input checked="" type="checkbox"/> vegetation/ shoreline planting | <input type="checkbox"/> mechanical grading |
| <input type="checkbox"/> stormwater treatment | <input type="checkbox"/> animal watering |
| <input checked="" type="checkbox"/> human/ animal exclusion | <input type="checkbox"/> culvert rehabilitation/ replacement |
| <input checked="" type="checkbox"/> signs | <input type="checkbox"/> culvert daylighting |
| <input type="checkbox"/> maintenance | <input type="checkbox"/> bridge replacement/improvement |

Comments
 Shoreline of lake unvegetated and partially eroding at human access area; vegetation could be improved between lake and Fawn Lake Road.





Area of Concern – Site: P50

Map Grid Location: E8 Site visit date/ team): 8/30/15/ JZ Drainage Area (Sq. Mi.): < 0.1
 Name & Location: Tributary at Cedar Rock Trail

1. **Culvert (diameter/material/length):** _____
 clogged aquatic organism passage/ perched
 crushed erosion (upstream/ downstream)
 lack of natural bed piping
 safety hazard overtopping
2. **Trail/ Road Impact (trail/ road name):** Cedar Rock Trail
 stormwater input sediment input
 bridge utilities
 unstable trail crossing erosion
 safety hazard human impact (hiking/biking)
 missing vegetation equine/dog impacts
3. **Upland/ Stormwater**
 nonpoint source pollution upland erosion
 pollutant point source unvegetated upland area
4. **Lake/Pond/ Reservoir (reservoir name):** _____
 erosion lack of vegetation
 equine impact human impact (hiking/biking)
 safety hazard water quality (temperature, algae, geese, fecal)
5. **Other Problem Area(s)**(list contributing factors)

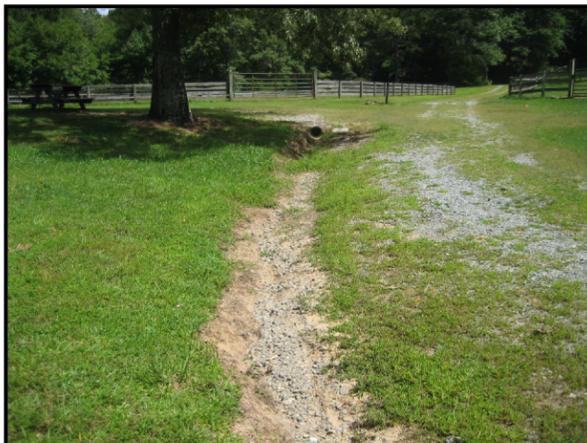
Potential Solutions

- | | |
|---|---|
| <input checked="" type="checkbox"/> relocate trail/close trail/road | <input checked="" type="checkbox"/> trail/road crossing improvement |
| <input type="checkbox"/> vegetation/ shoreline planting | <input type="checkbox"/> mechanical grading |
| <input type="checkbox"/> stormwater treatment | <input type="checkbox"/> animal watering |
| <input type="checkbox"/> human/ animal exclusion | <input type="checkbox"/> culvert rehabilitation/ replacement |
| <input type="checkbox"/> signs | <input type="checkbox"/> culvert daylighting |
| <input type="checkbox"/> maintenance | <input type="checkbox"/> bridge replacement/improvement |

Comments

Trail crossing serves as source of fine sediment. Head-cut downstream of trail may threaten trail and/ or be safety hazard in the future. Potentially install bridge. Culvert and stabilize head-cut.





Area of Concern – Site: P51

Map Grid Location: F9 Site visit date/ team): 8/31/15/ JZ Drainage Area (Sq. Mi.): < 0.1
 Name & Location: Drainage at horse barn

1. **Culvert (diameter/material/length):** 12"/ CPP
 - clogged
 - aquatic organism passage/ perched
 - crushed
 - erosion (upstream/ downstream)
 - lack of natural bed
 - piping
 - safety hazard
 - overtopping
2. **Trail/ Road Impact (trail/ road name):** _____
 - stormwater input
 - sediment input
 - bridge
 - utilities
 - unstable trail crossing
 - erosion
 - safety hazard
 - human impact (hiking/biking)
 - missing vegetation
 - equine/ dog impacts
3. **Upland/ Stormwater**
 - nonpoint source pollution
 - upland erosion
 - pollutant point source
 - unvegetated upland area
4. **Lake/Pond/ Reservoir (reservoir name):** _____
 - erosion
 - lack of vegetation
 - equine impact
 - human impact (hiking/biking)
 - safety hazard
 - water quality (temperature, algae, geese, fecal)
5. **Other Problem Area(s)** (list contributing factors)
 Unstable stormwater ditch.

- Potential Solutions**
- relocate trail/close trail/road
 - trail/road crossing improvement
 - vegetation/ shoreline planting
 - mechanical grading
 - stormwater treatment
 - animal watering
 - human/ animal exclusion
 - culvert rehabilitation/ replacement
 - signs
 - culvert daylighting
 - maintenance
 - bridge replacement/improvement

Comments
 Eroding, unvegetated stormwater ditch drains portions of horse fields. Opportunities exist for stormwater BMPs, including grassed/ vegetated swale.



APPENDIX G

Conceptual Design Drawings for High-Priority Stream Sites

- G1. Little River above Bridal Veil Falls (S02)
- G2. Shoal Creek (S15)
- G3. Little River at Hooker Falls Road (S17)
- G4. Cross-sections
- G5. Reference Data, Cross-sections
- G6. Longitudinal Profile
- G7. Reference Data, Longitudinal Profile
- G8. Planting Zones



Legend

- Top of Bank (existing)
- Top of Bank (design)
- Trail (existing)
- Trail (proposed)
- Boulder Structure
- Toe Wood Revetment

Relocate Little River Trail and Cedar Rock Trail outside of riparian buffer

Permanently close trail

Restore appropriate cross-section dimension to areas with eroding banks

Restore riparian buffer under power lines using low-growing, deep-rooted vegetation

In-stream structures to protect streambanks, promote bedform diversity, and improve habitat

Bridal Veil Falls

Start project (STA 0+00)

End project (STA 18+60)

CONCEPTUAL INFORMATION ONLY - NOT FOR CONSTRUCTION

Zink Environmental, PLLC

129 Norwood Ave, Asheville, NC 28804
828-273-8322 | jmzink@gmail.com

CONCEPTUAL DESIGN

LITTLE RIVER ABOVE BRIDAL VEIL FALLS (S02)

Designed By: JMZ

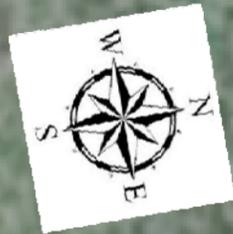
Date:
October 23, 2015

Scale:
1" = 100'

Little River Restoration Master Plan

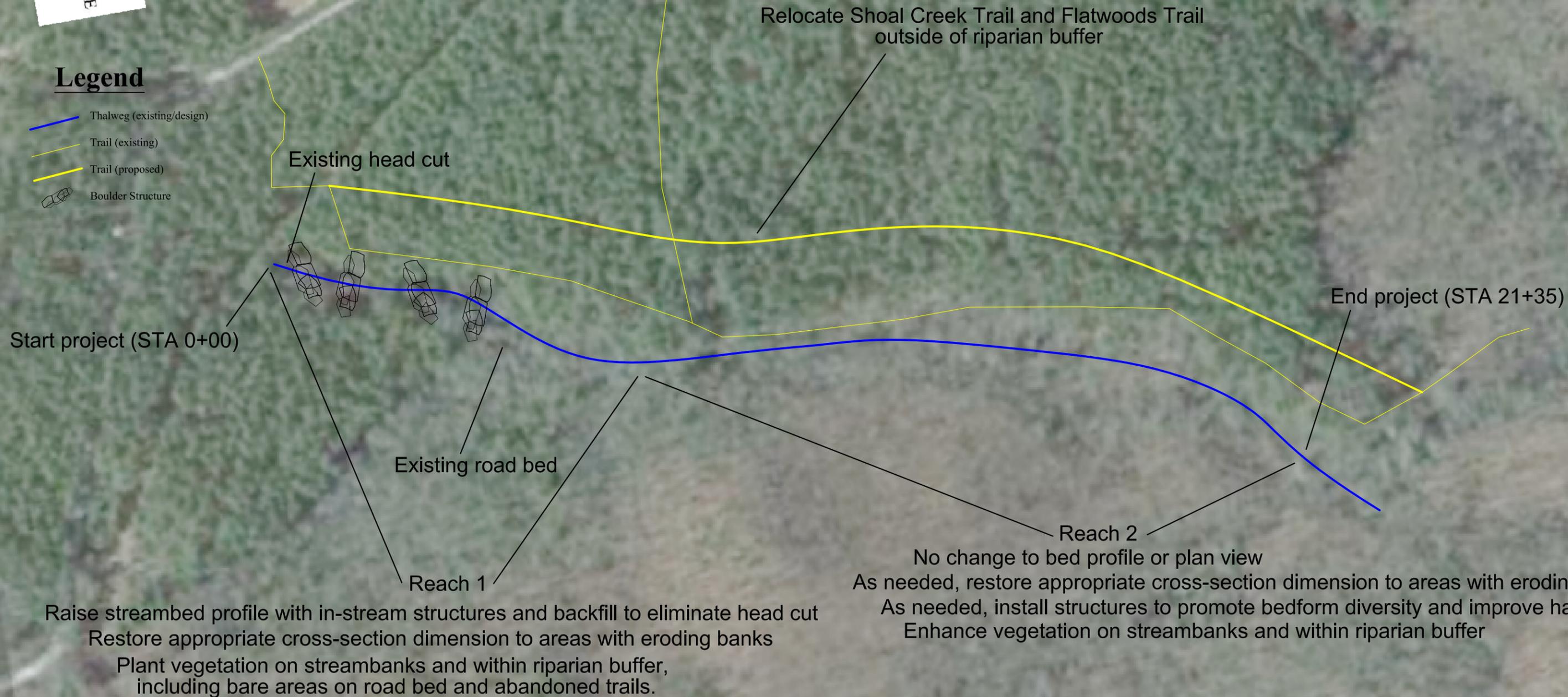
DuPont State Recreational Forest
Transylvania and Henderson Counties, North Carolina

Sheet
G1



Legend

-  Thalweg (existing/design)
-  Trail (existing)
-  Trail (proposed)
-  Boulder Structure



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129 Norwood Ave, Asheville, NC 28804
828-273-8322 | jmzink@gmail.com

CONCEPTUAL DESIGN
SHOAL CREEK (S15)

Designed By: JMZ

Date:
October 23, 2015

Scale:
1" = 200'

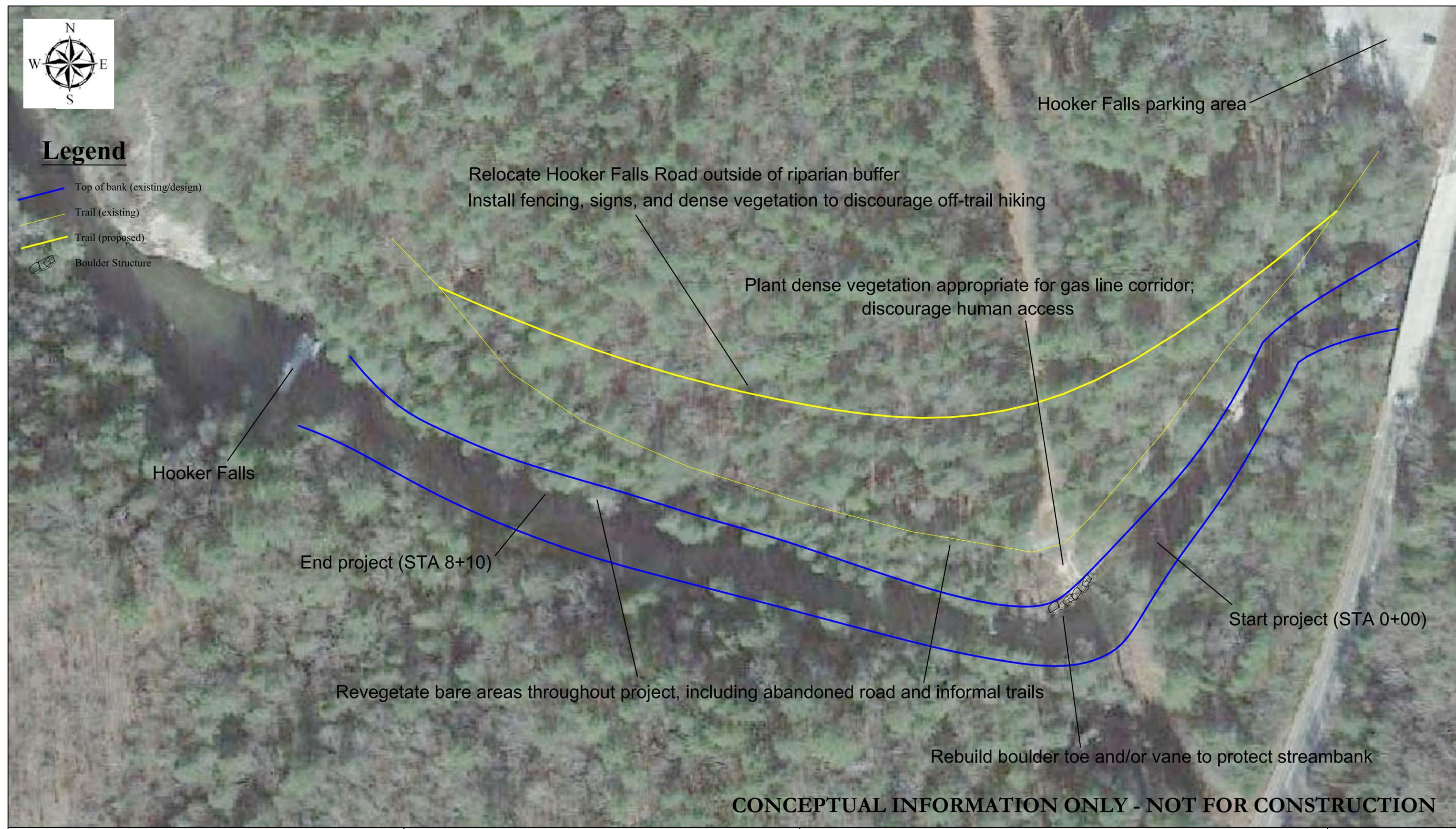
Little River Restoration Master Plan
DuPont State Recreational Forest
Transylvania and Henderson Counties, North Carolina

Sheet
G2



Legend

- Top of bank (existing/design)
- Trail (existing)
- Trail (proposed)
- Boulder Structure



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129 Norwood Ave, Asheville, NC 28804
828-273-8322 | jmzink@gmail.com

CONCEPTUAL DESIGN LITTLE RIVER AT HOOKER FALLS ROAD (S17)

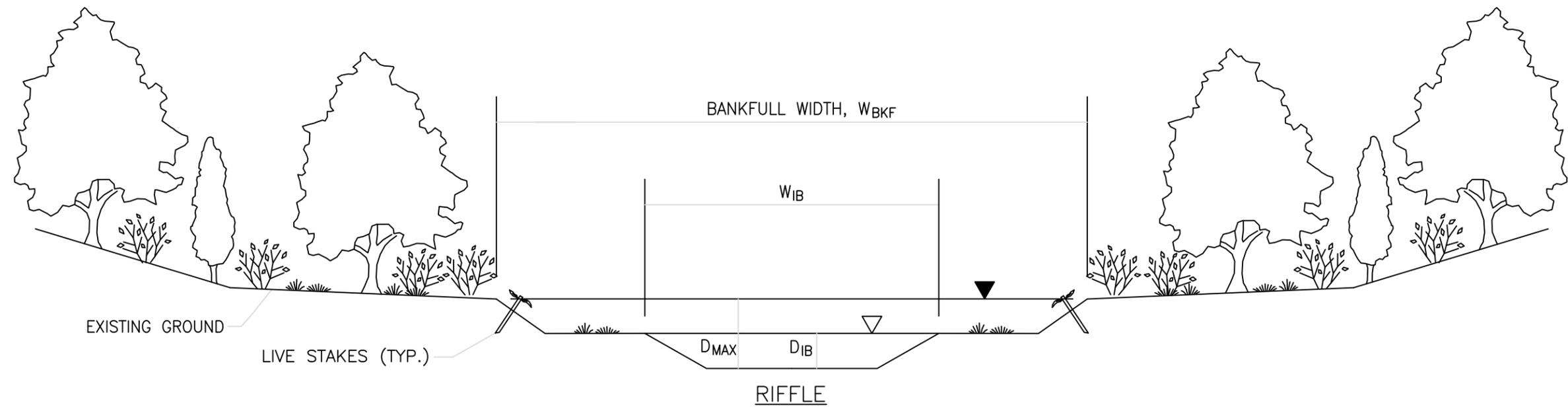
Designed By: JMZ

Date:
October 23, 2015

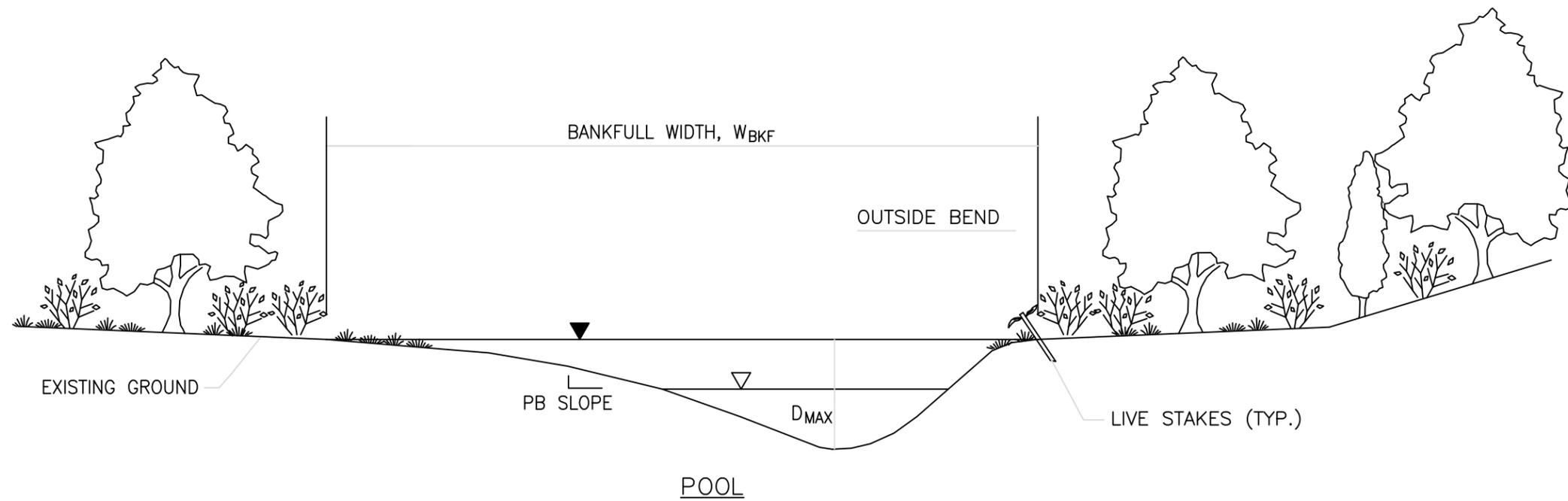
Scale:
1" = 100'

Little River Restoration Master Plan
DuPont State Recreational Forest
Transylvania and Henderson Counties, North Carolina

Sheet
G3



- ▼ BANKFULL WATER SURFACE
- ▽ APPROXIMATE LOW FLOW WATER SURFACE



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Zink Environmental, PLLC
 129 Norwood Ave, Asheville, NC 28804
 828-273-8322 | jmzink@gmail.com

CONCEPTUAL DESIGN
CROSS-SECTION

Designed By: JMZ

Date:
 October 23, 2015

Scale:
 NOT TO SCALE

Little River Restoration Master Plan
 DuPont State Recreational Forest
 Transylvania and Henderson Counties, North Carolina

Sheet
 G4

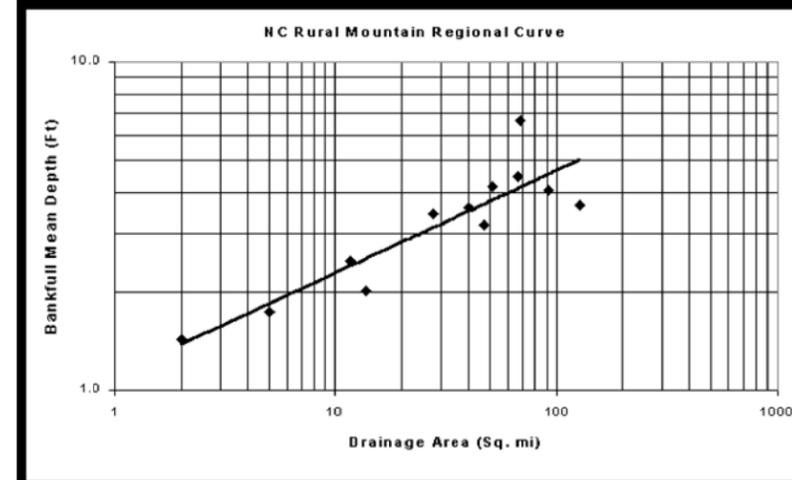
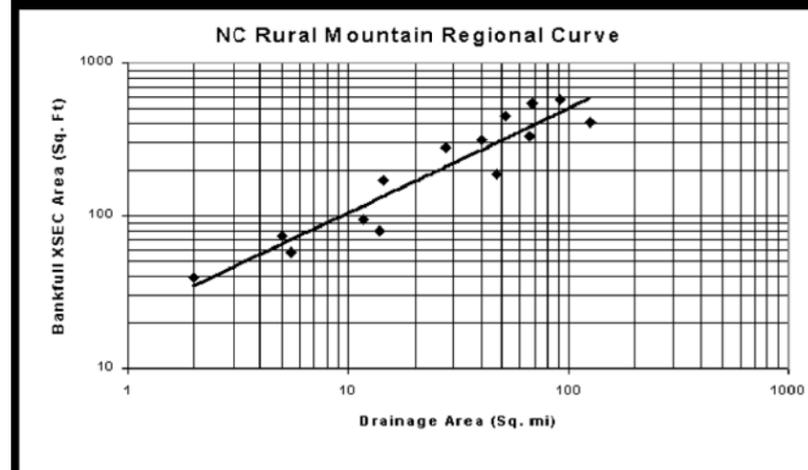
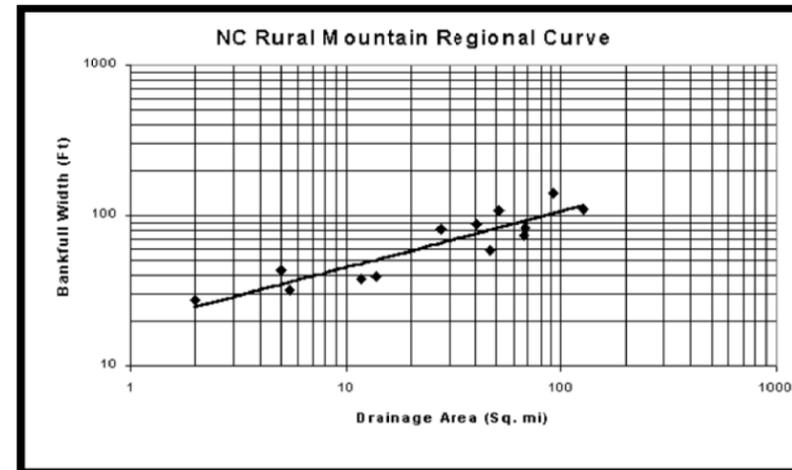
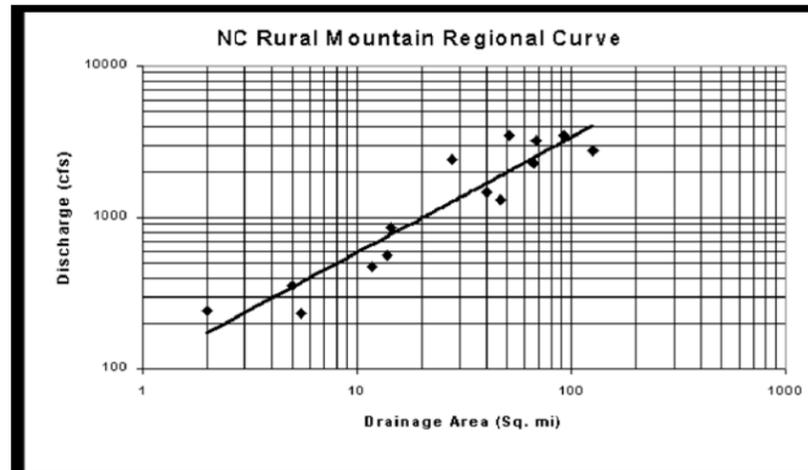


Table of Regional Curve data for the Mountain region:

Stream Name	Gage Station ID	Stream Type (Rozen)	Drainage Area (mi ²)	Bankfull Discharge (cfs)	Bankfull Xsec Area (ft ²)	Bankfull Width (ft)	Bankfull Mean Depth (ft)	Water Surface Slope (ft/ft)	Return Interval (Years)	Exceedence Probability (%)	Mean Annual Rainfall (Inches)
French Broad at Rosman	3439000	B4	67.9	3226	544.9	82.4	6.6	0.0009	1.3	0.77	98
Mills River	3446000	C4	66.7	2263	333	74.3	4.5	0.0035	1.9	0.53	90
Davidson River	3441000	B4c	40.4	1457	316	87.6	3.6	0.004	1.1	0.91	94
Catheys Creek near Brevard	344000	B4c	11.7	470	94.2	38	2.5	0.013	1.67	0.60	94
West Fork of the Pigeon	3455500	B3c	27.6	2433	277.9	80.6	3.4	0.0077	1.10	0.91	70
East Fork Pigeon River	3456500	B	51.5	3450	446.3	107	4.2	incomplete	1.59	0.63	70
Watauga River	3479000	B4c	92.1	3492	572	140.3	4.1	0.0033	1.25	0.80	56
Big Laurel	3454000	B4	126	2763	406	110.8	3.7	0.0045	1.59	0.63	42
East Fork Hickey Fork Creek	n/a	B3a	2.0	242	39.3	27.4	1.4	0.045	n/a	n/a	48
Cold Spring Creek	n/a	B4	5.0	352	74.4	42.9	1.7	0.025	n/a	n/a	50
Caldwell Fork	n/a	B	13.8	560	79.3	39.4	2.0	0.02	n/a	n/a	74
Cataloochee	3460000	B4c	46.9	1320	186.9	58.7	3.2	0.008	1.60	0.63	74
Bee Tree	3450000	B3	5.46	231.5	56	32.1	1.7	incomplete	1.85	0.54	
North Fork Swannanoa	344894205	C3	14.5	855.7	170.6	69.3	2.5	incomplete			

Equations for the Regional Curve Relationships:

Bankfull Cross-Sectional Area vs. Drainage Area: $y = 21.61x^{0.68}$

Bankfull Discharge vs. Drainage Area: $y = 100.64x^{0.76}$

Bankfull Width vs. Drainage Area: $y = 19.05x^{0.37}$

Bankfull Mean Depth vs. Drainage Area: $y = 1.11x^{0.31}$

* where x = drainage area

From: Harman, W.A., D.E. Wise, M.A. Walker, R. Morris, M.A. Cantrell, M. Clemmons, G.D. Jennings, D. Clinton, J. Patterson, 2000. Bankfull regional curves for North Carolina mountain streams. In *Proceedings of the American Water Resources Association conference: Water Resources in Extreme Environments*, Anchorage, Alaska, pp. 185-190.

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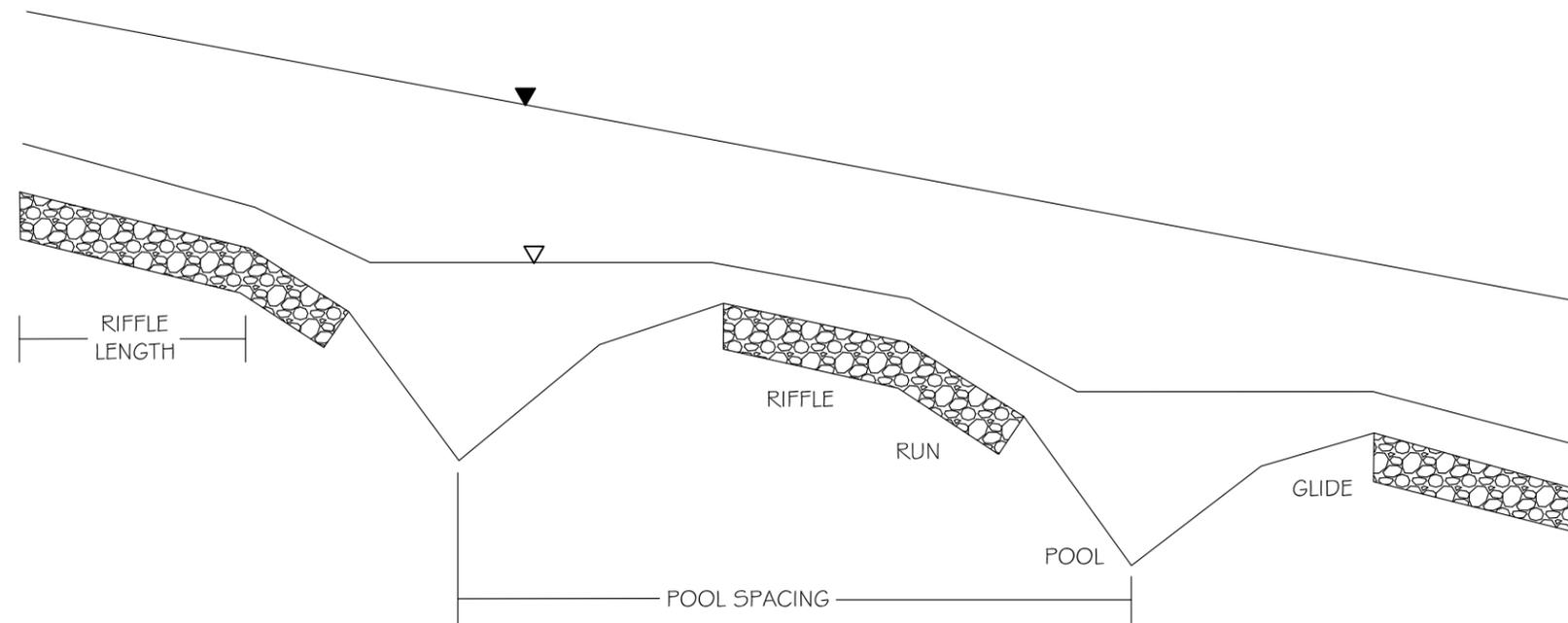
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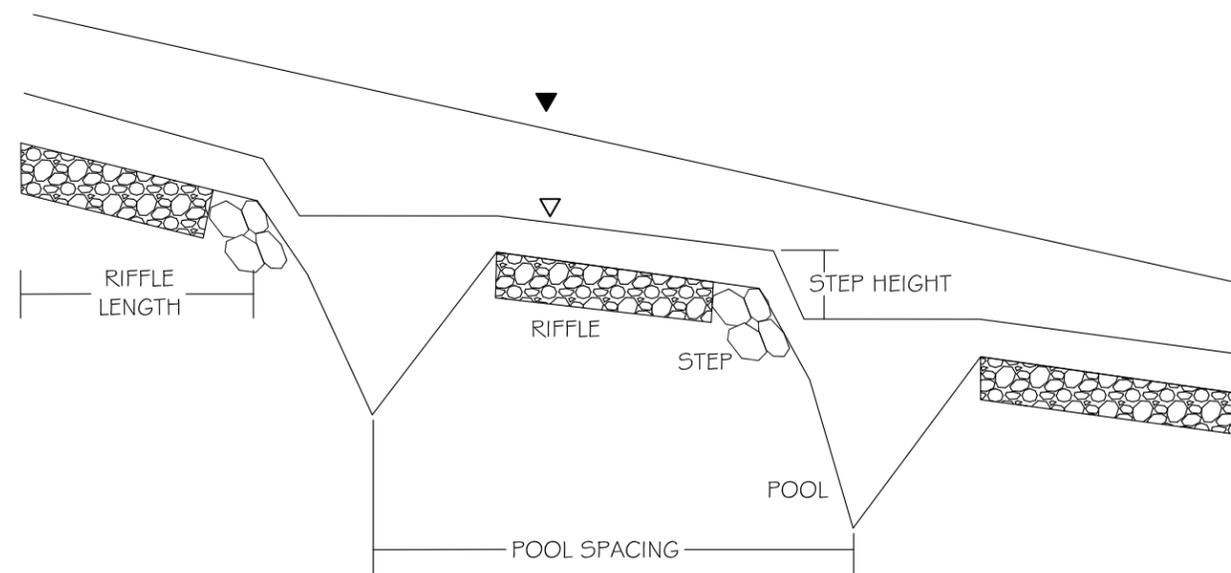
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LONGITUDINAL PROFILE: RIFFLE/POOL (MEANDERING) STREAM



- ▼ BANKFULL WATER SURFACE
- ▽ LOW-FLOW WATER SURFACE

LONGITUDINAL PROFILE: RIFFLE/STEP/POOL STREAM



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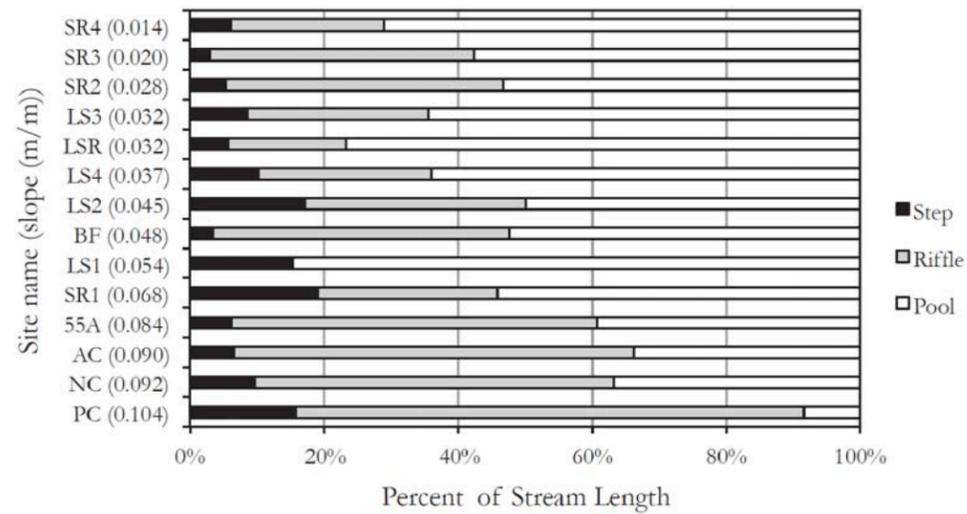


FIGURE 4. Percent of Length Occupied by Steps, Riffles, and Pools. Sites listed in order of increasing slope.

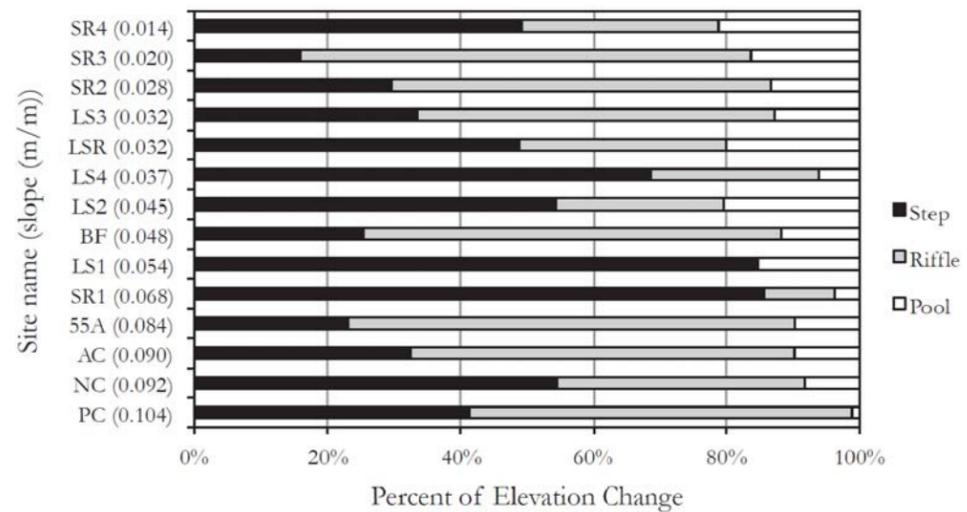


FIGURE 5. Percent of Elevation Drop Over Steps, Riffles, and Pools. Sites listed in order of increasing slope.

TABLE 3. Selected Dimensionless Ratios.

Site Name	Step Height Ratio	Riffle Slope Ratio	Riffle Length Ratio	Pool Length Ratio	Pool Spacing Ratio
SR4	0.01 (0.00-0.01)	1.3 (1.1-1.6)	0.6 (0.3-1.2)	0.5 (0.0-1.3)	0.6 (0.1-0.7)
SR3	0.01 (0.01-0.03)	1.8 (1.0-2.2)	0.9 (0.2-2.4)	1.0 (0.4-2.1)	1.8 (0.7-3.0)
SR2	0.04 (0.01-0.08)	1.5 (1.0-2.0)	0.9 (0.4-2.0)	0.9 (0.5-1.7)	1.8 (0.9-3.1)
LS3	0.02 (0.02-0.02)	1.9 (1.7-2.1)	0.5 (0.3-0.8)	0.6 (0.3-1.3)	1.1 (0.6-2.0)
LSR	0.02 (0.01-0.03)	1.6 (1.4-2.0)	0.4 (0.1-0.8)	0.6 (0.2-1.0)	0.8 (0.3-1.7)
LS4	0.02 (0.00-0.03)	1.0 (0.6-1.6)	0.6 (0.2-1.0)	0.4 (0.0-1.7)	0.6 (0.1-2.8)
LS2	0.04 (0.02-0.05)	0.8 (0.7-1.0)	1.3 (0.8-1.7)	1.0 (0.4-1.3)	2.1 (0.6-4.3)
BF	0.04 (0.03-0.06)	1.6 (0.8-2.5)	0.7 (0.4-1.3)	0.9 (0.4-1.2)	1.6 (0.9-2.2)
LS1	0.04 (0.02-0.07)	No riffles	No riffles	0.8 (0.5-1.2)	1.0 (0.7-1.4)
SR1	0.07 (0.01-0.20)	0.4 (0.2-0.5)	1.0 (0.5-1.7)	0.7 (0.3-1.4)	1.3 (0.5-2.5)
55A	0.08 (0.07-0.09)	1.2 (1.0-1.3)	3.3 (1.6-5.0)	1.0 (0.3-2.1)	2.8 (0.6-7.1)
AC	0.08 (0.06-0.09)	1.1 (0.8-1.5)	0.8 (0.2-1.7)	0.7 (0.5-0.8)	2.0 (1.2-3.1)
NC	0.09 (0.05-0.13)	0.7 (0.6-0.9)	1.5 (0.6-2.9)	0.7 (0.2-1.1)	1.9 (0.4-5.4)
PC	0.10 (0.05-0.17)	0.8 (0.5-1.2)	1.5 (0.5-3.4)	0.2 (0.1-0.4)	1.3 (1.2-1.4)

Notes: Means reported, with range in parentheses. Sites listed in order of increasing slope. See Table 1 for full site names.

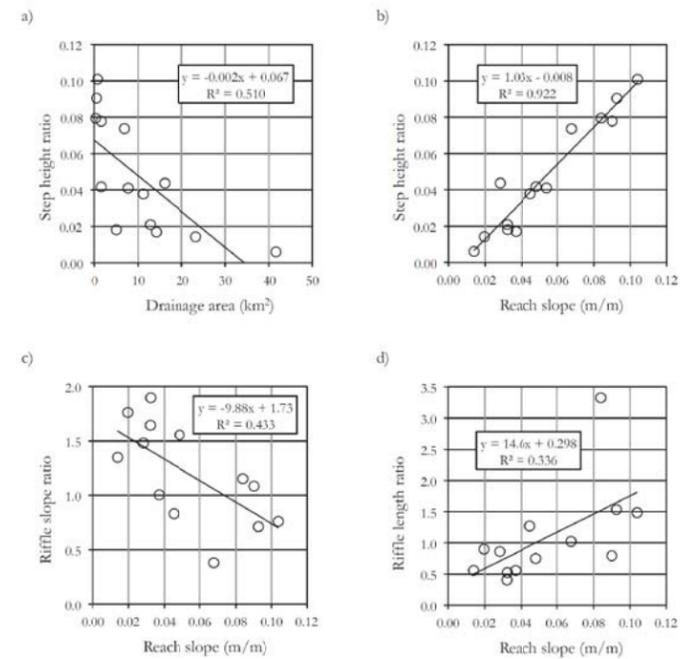


FIGURE 6. Correlations Between Selected Morphological Variables; All Significant at $p < 0.05$: Step Height Ratio and Drainage Area (a); Step Height Ratio and Reach Slope (b); Riffle Slope Ratio and Reach Slope (c); and Riffle Length Ratio and Reach Slope (d).

From: Zink, Jason M., Gregory D. Jennings, and G.Alexander Price, 2012. Morphology Characteristics of Southern Appalachian Wilderness Streams. Journal of the American Water Resources Association (JAWRA) 1-11. DOI: 10.1111/j.1752-1688.2012.00647.x.

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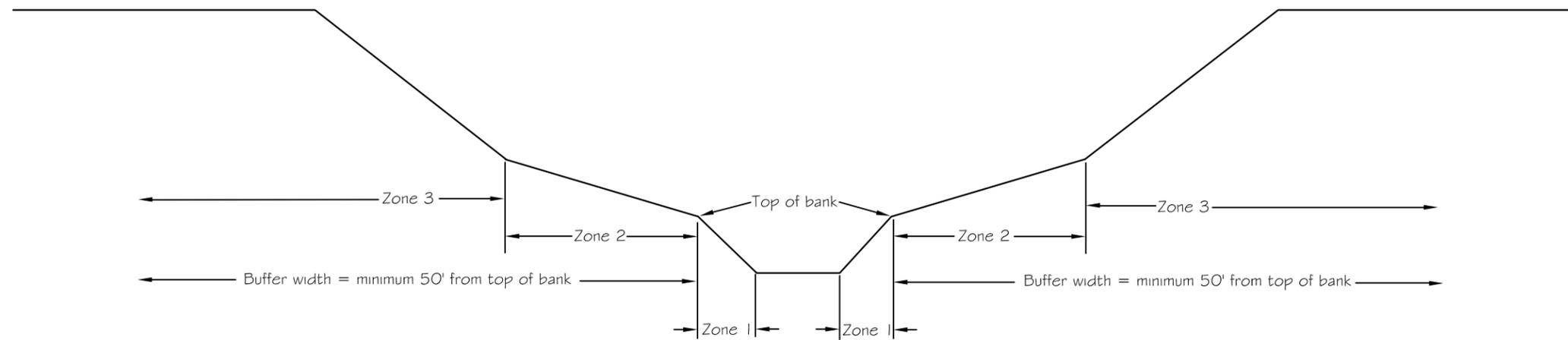
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Typical Valley Cross-section and Planting Zones



Zone 1:

- apply riparian seed mix (Ernst Seed Mix 178 or similar)
- install live stakes on 3-foot centers (see typical live stake planting list)

Zone 2:

- install sod mats (if available)
- apply riparian seed mix (Ernst Seed Mix 178 or similar)
- install live stakes on 3-foot centers (see typical live stake planting list)

Zone 3:

- apply upland seed mix (Ernst Seed Mix 210 or similar)
- install bare root trees on 10-foot centers (see typical bare root planting list)

Typical Live Stake Planting List:

- Black willow (*Salix nigra*), OBL
- Silky willow (*Salix sericea*), OBL
- Elderberry (*Sambucus canadensis*), FACW
- Silky dogwood (*Cornus amomum*), FACW

Typical Bare Root Planting List:

- Overcup oak (*Quercus lyrata*), OBL
- Green ash (*Fraxinus pennsylvanica*), FACW
- Silver maple (*Acer saccharinum*), FACW
- Sycamore (*Platanus occidentalis*), FACW
- Swamp chestnut oak (*Quercus michauxii*), FACW
- Red maple (*Acer rubrum*), FAC
- American beech (*Fagus grandiflora*), FACU
- Black cherry (*Prunus serotina*), FACU
- Sugar maple (*Acer saccharum*), FACU
- White oak (*Quercus alba*), FACU

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CONCEPTUAL DESIGN
PLANTING ZONES

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